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SOME NOTES
UPON
TECHNICAL EDUCATION

BY

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Being a Report presented to the Council of the
DURBAN TECHNICAL INSTITUTE
upon matters connected with Technical Education
observed in Britain and America in 1914.

DURBAN:
P DAVIS & SONS, LTD.
1915.

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THE thanks of the Council of the Durban Technical Institute are due to Senator the Hon. Marshall Campbell whose generosity has made the printing and publication of this Report possible.

PRINCIPAL'S REPORT to Council upon matters connected with Technical Education observed in Europe and America in 1914.

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the value of any education for the ordinary youth of the country beyond the "three R's." The majority of employers failed to co-operate with educational authorities and the majority of parents were only too anxious to see their children beginning to bring their contributions to the family exchequer. Educational authorities have doubtless tended to be too conservative and unsympathetic, fixing their own academic standard instead of striving to enable their scholars to meet the conditions of actual life. Teachers have too often hindered the progress of education because, having failed to enlarge their minds with new ideas, they have only been able to pass on to their pupils the classical and academic lore which they acquired in their own early education.

A Step Forward.

Realising that education is intimately bound up with economics, commerce and industries, educationists and employers alike will see that the War brings great opportunities, and they will, unless afflicted with a criminal blindness, work together for the enlightenment and prosperity of their country. Out of this co-operation, learning much from European and American methods of education, we should in this country shortly be able to take a great step forward in education. An indiscriminate admiration and adoption of foreign methods of education would be far from wise, but it is now becoming universally recognised that the enormous success of the Germans in industry and commerce is due mainly to their educational system. We must not make the mistake of holding German progress up to contempt, because the Germans have prostituted their genius for organisation and accurate thoroughness to a lust for conquest, but rather realise the urgent and pressing necessity of giving our best thought to the study of their methods and our best energies to the improvement of our educational system in a way which shall develop our industries and commerce and raise our young people to the highest ideal of citizenship. The following quotation from a recent letter to the London *Times* should be stimulating to South African opinion in this connection:

> "In four decades Germany passed from poverty to riches; from a poor agricultural country to an industrial and commercial Empire disputing with England the prize in the world's markets. She had the advantage of youth and of building up from nothing."

INTRODUCTORY REMARKS

We shall find the root cause of Germany's commercial and industrial success to be her education system and particularly the attention she has given to the matter of "continued education." This involves the recognition of the two facts:

(i.) The work of the Primary School is simply the laying of the foundation upon which the proper education of a child for his life's work is to be built.

(ii.) The nation's best attention must be given to the *continuation* of this education for the mass of the people.

It may at first seem strange that at the outset of my report I lay stress upon the educational system of a country which I did not visit. But in England and in America before the War was declared it was remarkably evident that the advanced thought of both countries alike was turned upon German educational methods; and on both sides of the Atlantic I came in contact with, or received reports from people who had recently been to Germany investigating the educational system. This present report would, therefore, be incomplete if I made no reference in it to what I have gathered of the special features of the educational system of Germany. At the same time I shall be calling attention to what without doubt are some of the most important lessons of the War.

It is hardly necessary to state that educational progress has by no means been confined to Germany; there are many points in the English and American systems which we as a country young in educational affairs, can profitably consider with a view to improving and developing our own system.

The Position of this Institute.

This Institute has already done much to educate public opinion in South Africa in matters relating to the training of young people, and I trust that the Council will see the importance of taking action upon various points raised by this report with a view to guiding public opinion further. It will be noticed that although some of these points perhaps come outside the narrower scope of a Technical College, all are more or less related to the work we have taken in hand, and until the present system of education is reorganised there is no other body or authority in Natal whose special business it is to deal with those matters which lie beyond the pale of ordinary Primary and Secondary Schools on the one hand, and the University College on the other.

The Durban Technical Institute has with some success sought to bring both technical and cultural education within the reach of the great mass of the people. In doing so it has attacked the problem stated in the following words by -one of the greatest authorities upon this subject:—

> "All modern States are suffering from the same disease—the lack of an adequate system of national education which shall consider the needs of the community as a *social group*, not an education which shall merely cater for and encourage the few among the people."

Bearing in mind the importance of this question, I propose directing attention especially to

(1) Commercial Education.
(2) Industrial Training.
(3) The Cultural Education of the Adult.

Convinced that the future welfare of the State is intimately connected with the extension of the above three branches of education, I strongly urge the necessity for providing facilities upon an adequate scale with this end in view.

2.—Industrial Training in Day Classes

“ See to it that no individual shall be compelled to choose between an education without a vocation and a vocation without an education.”—Eugene Davenport.

The problem of training the youth for the industries, has been faced by most civilised nations recently, and in certain countries it has been solved with a considerable amount of success. The solution found for one country, however, may not prove suitable to the conditions of another. If the problem exists in South Africa and if it has not yet been solved, we shall profit greatly by studying the experiments—successful or otherwise—which have been tried elsewhere.

The following figures which have been kindly furnished to me by Mr. Dukes, the Chief Inspector of the Natal Education Department, when he was acting Superintendent, afford an indication that the problem does exist in South Africa—even in Durban.

Last year 213 boys left the Government Primary Schools in Durban. Of these 68 had not reached their fourteenth birthday and 163 had not attained to Standard VI. That is to say 30 per cent. were under 14 and practically 80 per cent. had not reached the Sixth Standard.

It is not surprising then that of approximately 170 boys who finally left school 75 became messengers of various kinds—they were not fitted for anything else—and only 40 or less than 25 per cent. took up skilled trades.

To show what is possible it may be mentioned that in Munich, a city of 600,000 inhabitants, 92 per cent. of the boys leaving school at the age of 14 (they may not leave before) go straight to definite taught trades, and all of these receive eight hours’ instruction weekly at the Continuation Schools during the day in time allowed off by their employers.

The problem which has been solved elsewhere has not been solved in Durban. Something has undoubtedly been done towards this end by the Technical High School and our Day Classes for apprentices, but this kind of work needs wide extension.

In considering what is the best way of dealing with this problem, I propose first to give some accounts of the various types of schools which give technical training, and secondly to show how these schools are used to meet the problem which has been stated above.

Types of Schools giving Industrial Training.

The various kinds of schools in which preparation for industrial careers is given may be grouped in the way given below, although there is a great variety of type and nomenclature which renders classification difficult.

Group I.

Schools which do not teach definite trades but which give workshop training and theoretical and scientific instruction upon which all trades are based. These include Junior Technical Schools, Technical High Schools and Preparatory Trades' Schools. Closely allied are the "Eighth Year" classes of the German system.

Group II.

Trades' Schools which teach definite trades but which do not turn out the finished workman.

Group III.

Full apprenticeship Trades' Schools which turn out the fully qualified skilled workman.

Group IV.

Part time schools which are attended on a given number of half-days weekly by apprentices whose employers, voluntarily or compulsorily, allow time off for this purpose.

Group I.

The various kinds of schools in this group generally agree in the practice of giving at least two half-days' weekly to workshop practice in woodwork and metalwork. They also devote time to mechanical drawing and theoretical and practical science. But they differ in the amount of attention given to English subjects, to general culture and to physical training. It is to this group that the Engineering Section of the Technical High School, Durban, belongs. In no similar school that I have seen in my travels have the "humanities" been better taught, but from what I have seen, I am convinced of the necessity of making more of workshop practice. It is very important that the lad of 13 to 18 should be given a taste for a trade by learning early the pleasure of using his hands and doing some creative work. It is by this means we may overcome the common "preference for the genteel Clerkship to the better paid and more valuable labour of the trained mechanic or the farmer." In fact, in some parts of England, this preference has already been overcome by these means.

After spending two or three years in a school of this type boys are prepared to take up whatever suitable mechanical trade offers.

Under the guidance of Mr. Abbott, M.A., one of his Majesty's Inspectors of Technical Institutions, I visited many educational establishments in the West Riding of Yorkshire. I was greatly interested in a very efficient preparatory trades' school carried on under the headmastership of Mr. George Hall, at Holbeck, Leeds. The scope of the work done is indicated by the following extract from the school prospectus:—

> "No attempt is made to teach a student any particular trade or branch of trade but rather to provide that form of training which shall give him an insight into the many varied processes and the sequence of operations that are involved in the production of a simple machine detail or useful tool. Consequently the scheme provides for instruction in the necessary operations in the production of a finished article, from the preliminary considerations of learning to the final process, in accordance with current practice."

This school had an excellent syllabus of workshop practice which included wood work, bench work, forge work, metal plate work and moulding and casting.

The conditions of admission to the school are the same as those for our Technical High School, namely, age 13 and a pass in Standard VI. work of the primary school, and it was very remarkable to note how boys of this calibre completed this valuable course in two years.

Group II.

The characteristic of this group is that the schools commence at the age of 13 or 14 to teach young boys definite trades, but after a short course of two or three years they are expected to join an industrial firm to complete their trade training. They then continue their studies in evening classes. While attending the school, the boys spend roughly half their time in the workshop and half in the class-room.

Undoubtedly these schools serve a good purpose in those districts to which they are peculiarly suited. They do best in large industrial centres, where there is sufficient demand for the boys trained in the various taught by the school.

The London County Council maintains a number of such schools for photo engravers, cooks, waiters, book production, building, baking, confectionery, jewellery, etc.

A valuable paper on these schools was read by Mr. Bull at the Conference of Technical Institutions at Brighton, England, which I had the privilege of attending in July. This address, issued in pamphlet form, is in the collection of documents which is handed in with this report.

The Philadelphia Trades' School is a large school of this type, which has a staff of 13 and an average attendance of 235, or 18 scholars per teacher. Boys are admitted when they have passed the eighth grade (approx. Ex. VII. Standard) of the elementary school and are 13 or 14 years of age.

There is a preparatory year for those who are not ready to take up the trade course at once. The following table shows the trades taught and the number enrolled in each in 1912:—

Architectural Drafting	22
Mechanical Drafting	40
Electrical Construction	112
Carpentry	13
Patternmaking	9
Printing	9
Preparatory Classes	59
	264

Thirty-three pupils completed their three year course at the end of the year 1913.

Group III.

It is found both in Europe and America that full apprenticeship trades' schools can exist only under special conditions, and their number is consequently comparatively small.

The Williamson Free School of Mechanical Trades, Pennsylvania, is perhaps the best example of a successful trades' school of this kind in existence. It is described at length in an appendix to this report. Youths are admitted to this school at 17, or preferably 18 years of age, and are turned out thoroughly competent tradesmen after three years' training. I do not think, however, that schools on this model can ever become general, and that for two reasons:—

(1) As a rule boys cannot afford to wait until they are 17 or 18 before they start learning their trades. They would either have to remain in a secondary school in the meantime—which many parents could not afford—or else there would be an undisciplined hiatus in their education while they were waiting to commence their apprenticeship.

(2) The cost of making such schools general would be prohibitive.

Group IV.

In all probability the solution of the problem for the education of the great mass of our young people for industrial and business careers lies in the general adoption of Day Apprenticeship Classes at this Institute. A beginning has already been made with satisfactory results in connection with the apprentices in the department of the Durban Borough Electrical Engineer. The system is being applied in an increasing number of towns in the British Isles, a few of which are named below together with some particulars of the work done.

TOWN.	TRADES.	PARTICULARS.
Birmingham	Various	
	Brassworkers	Classes held daily 8—12.30 & 2.30—6. Each Apprentice attends two half days weekly.
	Library employees	Two half days weekly.
	Painters and Decorators	Attend School of Art two half days weekly.

TOWN.	TRADES.	PARTICULARS.
Belfast	Engineers	One day weekly.
	Typographers	Half day weekly.
	Commercial	Half day weekly.
	Ship Assistants	Half day weekly.
Brighton	Engineering	Two half days w'kly.
Gravesend	Engineering	Two half days w'kly.
	Portland Cement Workers	Two half days w'kly.
Halifax	Engineering	One half day weekly.
	Building Trades	One half day weekly.
	Junior Clerks	One half day weekly.
Leeds	Plumbers	One half day weekly.
Leicester	Pharmaceutical Chemists	One half day weekly.
	Cabinetmakers	One half day weekly.
Middlesborough	Civil and Constructional Engineering Trades Mechanical Eng.	Nine large firms and and the Corporation send their Apprentices.

Many more examples could be quoted, but these few show the growing tendency in England. An important point which should be mentioned in this connection is that it has been found that the best time for holding the classes, is *in the morning.*

It is in Munich, however, that the system of Day Apprentice Schools (or " Day Continuation Schools " as they are called) has been fully elaborated and made an integral part of the educational system, producing truly remarkable results.

Mr. Ira Jewell Williams, of Philadelphia, United States America, admirably sums up the effect of their schools in the following words:—

> " They prevent the pressure of industrial necessity from crystallising the condition of the young worker upon leaving school. They continue the restraining and beneficial effects of school discipline through the entire formative period. They revive the ancient pride of craftsmanship and promote greater intelligence, not only as to a particular industry but as to the whole world of what that industry forms a part."

INDUSTRIAL TRAINING IN DAY CLASSES

The following extract from "The Problem of the Continuation School," by Messrs. Best & Ogden, gives a brief account of the system in Munich:—

"Every boy in Munich between the ages of fourteen and eighteen (or seventeen should his apprenticeship only last three years) MUST ATTEND IN THE DAY TIME some school belonging to the continuation school system, unless he is already at one of the higher schools which prepare for the Universities and official and learned professions generally. According to his trade, he attends the special trade school instituted for members of his trade alone.

"There are schools for every trade which can provide more than twenty pupils between the age limits mentioned above, smaller numbers being grouped with a kindred trade. These schools are all entirely free. Each is managed by a committee representing the trade, the municipality, and the school. About half the cost is borne by the municipality; but in other parts of Germany the State usually contributes one-third.

"The boys attend for an average of about eight hours weekly, either during one whole day, or usually twice for half a day. With season trades the time is varied. The employers are obliged in every case to allow the time, and though this at first met with some opposition, everyone has long become converted by the excellent results, and the employers themselves are amongst the most enthusiastic supporters of the schools, many of them making valuable presents of machinery and materials.

"The Special School Buildings—in which fifty-six trades have their separate classes—are seven in number, and are distributed throughout the town, each with a higher division for journeymen, foremen, and master-workmen; three more buildings are now in course of construction at a cost of £100,000.

"In every case, special school workshops are intimately united with the classrooms for theoretical instruction, as THE WHOLE OF THE CONTINUED EDUCATION OF THE BOYS IS CENTRED ON THE PRACTICAL WORK there carried out in closest connection with their actual trade."

A Typical Course.

The following time-table for brassworkers is a normal specimen:—

	Age 14-15	15-16	16-17	17-18
Trade arithmetic, bookkeeping ...	1	1	1	1
Business composition, essays and reading ...	1	1	1	1
Citizenship, sensible living and hygiene ...	1	1	1	1
Information about trades, goods and tools ...	1	1	—	—
Drawing ...	3	3	2	3
Drawing ...	3	3	2	3
Practical work ...	—	—	2	3
	7	7	7	8

The first three subjects are invariably taught in all trades, though the atcual treatment is adopted to each particular trade. There is also an hour devoted to religious instruction till the end of the sixteenth year, making a total of eight hours weekly.

Classes are held:—

		Afternoon.
Tuesday morning ...	8 to 12	2 to 7
Wednesday morning ...	7 to 12	2 to 7
Thursday and Friday morning ...	8 to 12	2 to 7

It is remarkable to find what splendid instruction is provided for every trade. Provision for the following trades is described by Best & Ogden:—Fine Mechanics, Fine Workers, Gunsmiths, Coachmen and Drivers, Bakers, Butchers, Cooks and Waiters, Chimney Sweeps and Stokers, Shoemakers, Printers, Gardeners and Hairdressers.

THE ARGUMENT FOR DAY CLASSES IN PREFERENCE TO EVENING CLASSES HAS BEEN CONCISELY STATED BY DR. COOLEY, SUPERINTENDENT OF EDUCATION FOR THE CITY OF CHICAGO, WHO RECENTLY SPENT TWELVE MONTHS EXAMINING THE EUROPEAN SYSTEMS OF TECHNICAL EDUCATION.

He says:—

> “For the young man who can work all day and study all night, England makes ample provision. What strikes the observer who has seen the day instruction provided in Germany is the excessive demand made by the English system upon the physical endurance and will power of the rising generation. My observation leads me to believe that the demand is too great and is sapping the vitality of the English youth.”

3.—Commercial Education

Although much attention has been devoted during recent years in England to the subject of commercial education, and a great deal of instruction is now being given in evening classes in the organised group courses, it must be admitted that this branch of education is still in its infancy in the Old Country. It is, in fact, remarkable that though the British nation is the greatest commercial nation in the world, she has neglected commerical education, preferring rather to employ the educated foreigner both in Home and Foreign trade than to spend the necessary funds on training her own sons. In Manchester alone there were 20,000 Germans recently at work in office and factory. The inevitable result has been that since for some years past the commercial pre-eminence of Britain has been challenged, trade has been steadily directed elsewhere; for the commerical man with the best technical training succeeds in capturing the market.

We in South Africa are equally blind to our own interests.

I have been asked several times by one of the most prominent men in the business world in Durban "What is commerical education?" "How can you teach commerce?"

These quesions can be answered:—

(1) By quoting from a well known English authority on commercial education the following summary of the mental equipment required by a merchant

(a) An effective knowledge of foreign languages.
(b) A knowledge of the modern methods of importing and exporting goods, including freightage and modes of transport.
(c) A through knowledge of the goods in which he deals and of the sciences bearing on his trade.
(d) A knowledge of the markets in his own and in foreign countries and of the customs of the trade.
(e) An understanding of foreign tariffs, weights, measures, moneys and the exchanges.
(f) An acquaintance with the technicalities of commercial documents, such as Bills of Exchange, Bills of Lading, Insurance Policies and so forth and some knowledge of commercial law.

(g) A knowledge of the principles of bookeeping and accountancy.
(h) A knowledge of the economics bearing upon commerce and the use of trade statistics.

And:—

(ii.) By considering what is being done in other countries.

Commercial Education in other Countries.

THE UNIVERSITIES.—The older universities of Oxford and Cambridge have, it is true, in recent years devoted considerable attention to the subject of Pure Economics. It has been left, however, to some of the newer universities, notably Birmingham, Liverpool and Manchester, to establish faculties of Applied Economics and Commerce. There is a school of Economics in conection with the University of London and in the University of Wales there are lectureships or professorships of political science.

In America the need for Commercial Education of Univesity standing has been long recognised. The Wharton School of Finance and Economy, Philadelphia, for instance, was founded in 1881.

This school constitutes the faculty of commerce of the University of Pennsylvania and was the first to be established in America, having been endowed by Joseph Wharton, D.Sc., L.L.D., of Philadelphia, who wished thereby to provide:—

(i.) "An adequate education in the principles underlying successful civil government."
(ii.) "A training suitable for those who intend to engage in business or to undertake the management of property."

The Wharton School prepares young men for Industry, Commerce, Finance, the Study of the Law, entrance to the Public Service and for Teaching. All regular courses embrace:—Political Economy, Economic Resources, Accounting, Government, English, Chemistry, History and Physical Education and a selection from the following advanced groups,—emphasis being laid upon original research work,—Business Law, Commerce and Transportation, Economics, Finance and Accounting, Geography and Industry, Insurance, Political Science and Sociology.

The schemes of subjects and syllabuses of work arranged under various heads just enumerated are most interesting. Reference is suggested to the school catalogue for further details.

The four year course leads to the degree of B.Sc. (Econ.). Short of this, however, there are many varied and special day and evening courses.

The teaching staff of this section alone of the University number 54. The day students number about 800 and the evening students about 1,000.

Coming to South Africa it is worthy to note that in Johannesburg the importance of University teaching in commercial knowledge is realised for a professorship in Accountancy has recently been founded at the School of Mines. A lectureship in Economics has also been established at the South African College through the munificence of Mr. J. W. Jagger, M.L.A.

Schools of Commerce.

Schools of Commerce are sometimes established as separate colleges, sometimes as departments of technical colleges and sometimes as modern sides of public schools.

In England Day Schools of Commerce are almost unknown. One of the very few is to be found at the Huddersfield Technical College, which I visited in September. The number in attendance was very small, and it is evident that sufficient importance was not attached to the venture. The scheme, however, is well planned and deserves notice. A full three-year course suitable for students from 15 or 18 years of age is provided, including instruction in the following subjects:— Shorthand, Typewriting, Bookeeping and Accountancy, Office Routine and Precis Writing, Commercial Arithmetic and Mathematics, Commercial Geography and History, Economics and Commercial Law, French and German. The Technical College Diploma in Commerce is awarded to students who complete the three years' course satisfactorily, and a College Certificate is awarded to those who complete successfully the first two years of the Diploma Course.

America is the home of the private school which teaches Shorthand, Typewriting and the like. These institutions date back so far as 1860 and they prepare pupils mainly for the lower ranks of commercial life. But Public Schools, Technical Colleges and Universities during the last 33 years in increasing numbers have been giving commercial courses of higher grade. At the same time the number of private schools and the number of pupils in them has been decreasing.

As an example of what is being done at a public school the work of the Central High School, Philadelphia, may be mentioned. This school gives two-, three- and four-year courses in commercial work, covering the following subjects:—English Language and Literature, Modern Languages, Mathematics, Science (related to commercial products), Commercial Geography and History, Economics and Civics, Business Technique (including penmanship and Business Forms and Bookkeeping), Shorthand and Typewriting, Office and Banking Practice, Accountancy, Commercial Law and Ethics of Business. A degree (B.Sc. Economics) is given on completion of the course.

The work of a technical college is illustrated by the brief account of the Drexel Institute, Philadelphia, which is given as an appendix to this report.

It is to Europe, however, that we must turn to see the full development of commercial education. With wits sharpened by keen competition, the Countries of Europe have had the foresight to perceive that their trade is developed by paying attention to the education of those engaged in commerce. Large grants have therefore been made in aid of organised commercial education. State supported Technical and Commercial Colleges have been provided on a liberal scale for all classes of workers from employers downwards, to teach the best methods of making and distributing goods.

If we take almost any of the countries of modern Europe at random we find that the same attention is being paid to commercial education. The Commercial Schools of Germany are famous for their number and efficiency. But let us take an example from one of the smaller countries, such as Switzerland, which, with a population of about three millions, has some twenty Schools of Commerce. The town of Neuchatel in Switzerland has a population of 20,000, and it has a School of Commerce which is larger than the Durban Technical Institute. The permanent staff numbers 24 and the auxiliary staff 12. The building contains over 30 class-rooms, four laboratories, besides a Library, a Museum, a Gymnasium, etc. Pupils leaving the school at 18 and 19 have no difficulty in finding first-class clerkships all over

Europe. The school provides a four-year course, and awards a "Diploma" at the end of the course. Students completing satisfactorily three years of the course get a "Commercial Certificate."

The following subjects are taught throughout the full four years:—Commercial Bureau (see below), French, German, English, Italian and Spanish, Handwriting and Shorthand.

The following are taken for the first year only:—Arithmetic, Geography (general).

For the first two years:—Algebra.

For the first three years:—Chemistry.

For the last three years:—Law, Commercial Geography.

For the last two years:—Economics, Physics, Testing goods for fraud, the Study of Commercial Products, Typewriting.

Last year only:—Industrial Law, Railways, Insurance, Banking, Contemporary History, Geographical Events.

The Commercial Bureau Course appears to be a most valuable scheme, and is well-known throughout the Continent. It includes a thoroughly well-organised scheme of running a business, including the necessary bookkeeping and accounting, ordering and paying for goods, and generally all the transactions of a merchant.

The contrast between Neuchatel with a population of 20,000 and some 200 day students in its School of Commerce and Huddersfield with a population of 100,000 and barely 20 full-time commercial students in its Technical College, is perhaps the most eloquent commentary on the British attitude towards commercial education which we could imagine. It should be noted that Neuchatel is not an extreme case but a typical one, and one which we in Durban can well afford to study.

Commercial Instruction in Evening Classes.

I do not wish to underestimate the value and importance of the excellent quality of the work which I saw in evening schools and Technical Colleges in England. The system of commercial education in evening classes is now splendidly organised, and I was much impressed by the seriousness of the students from the youngest upwards. Group courses involving attendance on three evenings weekly are in force generally, and mental culture and physical training receive due attention in the scheme. But after all there is a very rigid limit to the efficiency of work which can be done in evening classes after a full day in the office or store. It is impossible for a youth to obtain by evening work alone the same mastery of a subject as he obtains by continuous day study. No amount of supplementary training can fully make up for the lack of thorough regular training given through the period of youth.

Suggestions.

With reference to the above remarks on Commercial Education in England and America the following suggestions are offered for consideration:—

(1) Every endeavour should be made to provide day instruction of the best kind in commercial work.
(2) The most promising students of our Technical High School should be offered inducements to go on to the more advanced classes of the Day School of Commerce after completing the High School course. Such inducements might include low fees, a liberal provision of exhibitions, and, where necessary, maintenance allowances.
(3) By arrangements made with employers or by other means instruction should be provided for those youths of fourteen and eighteen who have to go out to work, in the form of regular instruction in the daytime at certain hours when they are allowed time off for the purpose.

4.—Notes on Technical Education in Evening Classes

The system of technical education in Evening Classes in Great Britain is now undoubtedly the most highly organised and complete in the world. The method of organisation is based upon group courses such as have been established in Durban for the past six years. During this period the system has become general and under the leading education authorities such as the County Council of the West Riding of Yorkshire, and the London County Council, it has been fully worked out. Excellent schemes of courses have been drawn up with great flexibility as to detail with a view to meeting local requirements. Syllabuses of work suitable to the peculiar needs of evening classes students have been provided. The following paragraph quoted from the Handbook of the Education Committee of the West Riding gives the key-note to the methods of instruction aimed at:—

> "It should be borne in mind that the students (in the Evening Schools) are almost invariably adolescent and their intellectual needs differ markedly from those of Day School pupils. The Teacher should, therefore, endeavour to develop the capacity to think—to open out new worlds of thought and to add new interests to life."

To the subject of English Language and Literature I found the greatest attention paid everywhere, much care being given to the selection of suitable authors for study. Economic and Industrial History both in text-book form and in biography and story are generally included in the English courses. There is no doubt that we in Durban should do our utmost to persuade students attending evening technical and commercial classes to include English as part of their regular courses.

Other subjects included both in Industrial and Commercial courses were Physical Training, Ambulance and Vocal Music. The complete course of instruction in Evening Classes may extend over six years.

The Preparatory courses and the First Year and Second Year courses are usually carried on in the elementary and secondary school buildings of the town.

Third, fourth and fifth year courses are held at the central Technical College.

Many years ago Mr. W. T. Stead called attention to the fact that the magnificent school buildings all over the country were lying idle for the greater part of the 24 hours of the day. If he were alive to-day he would no longer be able to complain of this waste for there is probably not a town in Great Britain where the Schools are not used by night as well as by day. I visited a Technical Evening School at Brighouse, in Yorkshire, in a building which by day was used as a Girls' Secondary School. The laboratories, art rooms, kitchen, work-rooms, and class-rooms were all being used in to the fullest extent. Both young men and young women were in attendance.

There were many details of the work of evening class organisation that I gathered which will be of great value to our work in Durban, but they are beyond the scope of this report. Some few interesting points, however, remain to be mentioned.

The Boy Scout Movement.

This movement at Home attracts an apparently older class of youth than it does in our local organisations. At Dewsbury I found a very interesting arrangement in existence between the Scouts and Education Authority. The Scout Master comes to the Evening School and gives three half-hours instruction to the students there, the time being arranged in the following way:—

First half-hour.—All Commercial Students are instructed together.

Second half-hour.—All Industrial Students are taken together.

Third half-hour.—All Scouts are taken alone.

The hour that each Scout thus gets at the Evening School is counted as attendance at Scout Headquarters. At the same time non-Scouts get a certain amount of instruction from the Scout Master.

The Effect of the School Leaving Age upon the Quality of the Work done in Evening Classes.

I gathered from Mr. Abbott that the boys in the Evening Schools in London and Newcastle, where the leaving age from the day schools was 14, were incomparably better than the boys in the Evening Schools of the West Riding of Yorkshire, where the leaving age was 13 years. It is thereupon evident that this further year of a boy's life is of the greatest importance from the educational point of view.

Workshop Classes.

I found that in Birmingham, in London, and in Yorkshire, as well as at various places in America, the evening Workshop Classes were always much appreciated. Everywhere as the capacity of the workshop was limited, there was the keenest competition to gain admission to the classes on the part of apprentices and improvers, and both employers and employees very highly valued the instruction given.

5—Domestic Science and Arts

I had the privilege of visiting a typical American School of Domestic Science at Philadelphia, United States America, and a very effective departure in Domestic training at Dewsbury, Yorkshire.

The former is described in the Appendix to this report entitled "Visits to the Drexel Institute, Philadelphia" (Page.) The object of this school is to train women to "practice, superintend and teach the industries known as Domestic Science and Arts." The School

(1) Trains teachers, granting them diplomas upon finishing a two-year course.
(2) Trains mature women as school matrons, institutional housekeepers, etc., granting them certificates at the end of a year's course.
(3) Gives extension courses in separate subjects, issuing certificates of attendance upon the successful completion of each course.
(4) Provides a Secondary School Course in Domestic Science for Girls.

From the appendix it will be observed that the importance of including English in a Domestic Science course is fully appreciated in America.

It will be seen further that this Department of the Drexel Institute deals with the subject in a comprehensive way giving a wide range of training. An extensive and well equipped suite of rooms is set apart for this purpose.

The work done at Dewsbury is of quite a different type. It appeals to a poorer class population in its Home Making School, giving a very valuable course of instruction to girls leaving school.

A large house is rented in the vicinity of the Technical College. The training given practically in this Home is supplemented by cookery and other demonstrations lessons at the College.

In the words of the leaflet issued by the school:

> "The School is intended to provide girls over 13 years of age who have completed their ordinary school course at the elementary school with A PRACTICAL TRAINING ON HOUSEHOLD DUTIES.

> "The main object of this course of training is to equip the girls as far as possible for the life they will lead in their own homes, to teach them economy, thrift and right methods of household management, and to encourage them to think, plan and execute on their own initiative, to increase their interest in domestic matters and to widen their mental horizon."

The Course of Training includes instruction in Cookery, Laundry Work, Needlework, Household Management, Marketing, Hygiene, Sick Nursing, Care of Infants, Upholstery, Mending and Renovation of Garments, and in Reading from good Standard Books.

It may be suggested that this is a very wide course for young girls, but it is clear that all these various branches are required by the wife of the working man who has a family to bring up.

The Course extends over one school year—two terms of 21 weeks each. Thirty girls pursue the course at a time—fifteen new girls being admitted each term. Thirty scholarships are awarded annually to cover cost of tuition. A small fee of 5/- per term is charged to sholarship holders, and this is refunded on 90 per cent. of the attendances being made.

The girls work in the house in the mornings and attend classes at the Technical College in the afternoons, except that a section attends cooking lessons in the morning.

The Headmistress, Miss McNicoll, kindly showed me over the house when the girls were at work and explained the method of working. She and another mistress live on the premises. Two of the girls in turn live in for a week at a time. The other girls come daily at nine o'clock. All the work of the house is done by the girls—scrubbing, cleaning, mending, cooking, etc., each girl getting her turn at every occupation, and, to give completeness to the round of duties, a model baby is washed and dressed daily. In the second term the girls are required to manage the finances. They have to scheme and plan to make ends meet, the daily budget naturally being submitted to the head mistress.

The house was plainly and simply furnished without bareness. The girls all appeared happily interested and keen. It was evident that they learnt to take a pleasure in housekeeping as an art. The cheerful way in which scrubbing the floors, cleaning brass work, washing and ironing were done indicated that these operations were no longer looked upon as a drudgery.

Mr. Taylor, the Principal of the College, was good enough to supply me with typed copies of the time-table and the syllabuses, which are full of interesting details.

It seems to me that one of the earliest duties which the Durban Technical Institute should undertake is that of training Domestic Science teachers. Such people, sent abroad with a satisfactory diploma after a period of training with us should prove of immense importance in spreading a proper knowledge of cookery, household management, etc., in this country. It may not be the work of this Institute to establish a Home Making School, but such a school is needed as much in Durban as in Dewsbury. The Institute should, however, I think, provide such a scheme of courses as that described above in connection with the Drexel Institute.

Particular attention should be given to the establishment of a HOUSEWIFE'S COURSE, both for those who desire to become well-fitted to manage their own household and for those who desire to qualify for institutional housekeeping, the management of school and other boarding establishments.

The importance of a thorough training in housekeeping in this country can hardly by over-estimated. On account of the presence of coloured servants in the house, the middle-class girl does not get the preliminary training in cookery and household matters which girls similarly situated elsewhere would receive. Yet a knowledge of plain cookery and household management are necessary to every housekeeper. Though she may not expect regularly to have to do the actual work herself, it is absolutely essential she should know how to do it. She must be superior to her coloured or other servants in these matters and in an emergency she may even have to see things through herself.

Most housekeepers have to superintend the linen and the laundry work, and they require to see to all kinds of domestic work. They, therefore, need a knowledge of plain needlework and the use of the sewing machine. They would find a course of lessons on laundry work invaluable. They must know how to clean any given article, the best materials to use and the time required. A Housewife's Course should therefore include Cookery, Housewifery (including Household management and accounts), Needlework, Dressmaking and Laundry.

Ladies who completed such a course satisfactorily would be well qualified for such positions as matron of a school or housekeeper to an institution.

Provision of Meals.

Associated with the question of Domestic Science is the matter of the provision of school meals and refreshments for Students. This depends very much upon local circumstances.

In England the luncheon interval extends for one and a half or two hours in length. Consequently most children get home for their mid-day meal. In Schools where cookery is taught, however, provision is almost always made for children who live at a distance to have a hot dinner at the School at cost price or less. In Swindon it is the custom for the children to pay slightly less than cost price for a two course meal and the teachers to pay slightly more than the cost price.

At Dewsbury Technical College I saw a roomful of poor children who had come in from a nieghbouring School for a free meal. It was very evident that they needed it and appreciated it.

At some places light refreshment is provided for afternoon and evening students. Many students attend classes at some inconvenience in the matter of meals. Such students at Smethwick, Birmingham, for example, may have a glass of bovril and milk, which is suppled by the caretaker's wife at certain definite hours. One of His Majesty's Inspectors told me that he himself had found this a great convenience.

Enrolment for Cookery Course.

At Dewsbury the difficulty of getting the right people to attend the Cookery Classes and of getting them all to commence on the first lesson is admirably got over. The first lesson is well advertised and is free to all-comers. An interesting demonstration is then given by the cookery mistress, and intending students are told that they can do the practical work themselves at the next lesson. When the lesson is over the organising master is in attendance to enrol members. He informed me that he is always able to fill up his class on the first meeting in this way. This method will be well worth trying in Durban, for the difficulty of getting the ladies to begin early is chronic.

6—Schools of Art

> " I regard Durban as the best place in the Union for the development of a robust South African Art. It possesses the essentials for an all round artistic development—Industry and Leisure. Up to now, so far as I have been able to observe, the latter is the only side that has been catered for, but the demand is rather from the other. With Durban's industrial activity there ought to be a strong decorative and commercial bias in the curriculum of the School of Art, and various allied Crafts should be in operation."—Mr. Christie Smith.

There is no doubt that in Durban there is scope for Art School work in both Fine and Applied Art, and any reconstitution of the School of Art should keep both these aspects in view, so that ultimately we should contribute no mean share to the development of a distinctive South African Art which will be evidenced in both pictorial art and in the industrial applications.

There is sufficient wealth in South Africa, if it be properly directed, to foster such a school of local art. Our wealthy South Africans travel widely in Europe and elsewhere, and are familiar with the art treasures of the old countries. They doubtless have a sufficiently high appreciation of Art to prompt them to encourage its development in South Africa when they see that local talent receives the necessary instruction.

It is true we are a young country, but America is really not much older, and I was much struck when visiting Philadelphia to find that the Pennsylvania Academy of Fine Arts was already over a hundred years old and had produced many eminent painters, decorators, illustrators and sculptors of at least national fame. The importance of this clearly is that the Americans founded their school in the very early days of the State, and they have given themselves to the cultivation of the Fine Arts continuously from those early days.

As a further evidence of the local patriotism of Americans and its application to the building up of American Arts and Industries it may be mentioned that following the great Centennial Exhibition at Philadelphia and the interest it aroused in Art and Art education, a charter was granted in 1876 for the purpose

> " of establishing for the State of Pennsylvania a Museum of Art in all its branches and technical applications and, with a special view to the development of the Art Industries of the State, to provide instruction in Drawing, Painting, Modelling, Designing, etc., through practical schools, special libraries, lectures and otherwise."

The limits of space forbid my describing my visits to the American schools referred to, but as one evidence of the successful carrying out of the above aims the following list of occupations of former students of the School of Industrial Art is given:—

- Architects and Architectural Draughtsmen.
- Bookbinders.
- Builders.
- Cabinet Makers.
- Carvers in Ivory, Stone and Wood.
- Furniture Makers and Designers.
- Upholsterers.
- Interior Decorators.
- Decorative Painters and Designers.
- Decorative Sign Painters.
- China Decorators.
- Designers—Banknote.
  - Book Cover.
  - Carpet.
  - Costumes.
  - Embroidery.
  - Gas Fixtures.
  - General.
  - Jewellery.
  - Lace Curtains.
  - Millinery.
  - Music Cover.
  - Oilcloth and Linoleum.
  - Printed Stuffs.
  - Rugs.
  - Stationery.
  - Tile and Mosaic.
  - Upholstery.
  - Wall Papers.

Designers and Decorators of Pottery.
Designers and Manufacturers of Stained Glass.
Colorists.
Illustrators—Book and Periodical.
    Fashion Journals.
    General Commercial.
    Newspaper.
Engravers—Copper Plate.
    Steel.
Lithographers and Lithographic Designers.
Photo Engravers.
Photographers.
Plate Printers.
Metal Workers—Copper, Silver, etc.
Iron Workers.
Die Sinkers and Engravers.
Jewellers.
Modellers—Architectural, Terra Cotta and Plaster.
Modellers—Carved Leather.
Model Makers.
Mosaic Workers.
Seal Engravers.
Mechanical Draughtsmen and Engineers.
Landscape Gardeners.
Art Teachers, Directors and Supervisors.
Manual Training Teachers.

I give this list in full because it is the most complete list of artistic trades and professions I have seen, and it indicates the wide scope of the work of an Art School.

Many interesting observations regarding details of arrangement and organisation were observed in Art Schools both in England and America. Many of these would be out of place in this report, but perhaps I may mention a very interesting section of the work of Pratt Institute, Brooklyn, which section is very similas to a branch of the work of our own Art School. I refer to Saturday morning classes for children. A very artistic little illustrated pamphlet of 15 pages explains this work.

Pratt Institute offers on Saturday morning courses for children who wish to develop ability in either artistic or practical work.

There are classes in

General Drawing.
Cast Drawing.
Pencil Sketching.
Figure Sketching.
Water Colour Painting.
Landscape Design.
Applied Design.
Modelling in Clay.
Manual Training.
Sewing.
Cookery.
Serving.

The work is planned to meet the needs of both those who do not have such work in their regular school courses and those who wish more instruction or practice.

Boys and girls from 8 to 16 years of age are admitted. The classes meet from 9 to 12 o'clock on Saturday mornings, and the tuition fee for the session of six months, October to March, is 5 dollars (£1).

Both boys and girls are admitted to the Manual Training course, which extends over a period of two years. A very interesting course is followed, so that a keen interest is aroused and maintained in the children for working with their hands.

The New York School of Fine and Applied Art was not in session while I was in the City, but fortunately I met two members of the staff who had just returned from a visit to Germany, where they had been studying Art School methods at Munich and Berlin. These two teachers were the heads, respectively, of the Illustrative Advertising and Costume Design Department, and the Normal Art Department of their school. They were Art enthusiasts and were very keen about the application of Art to all spheres of industrial and commercial life as well as leisure.

In accordance with the aim set out in their school prospectus they were firm in the conviction that there was a sane balance between the academic point of view of 25 years ago and the modern obsession, that all Art must be instaneously turned into money value.

I saw some of the products of the Illustrative Advertising Department, and was convinced of the great scope there is for Art in this direction. In fact in every department of the school it is evident that the school authorities have got into touch with the artistic requirements of the community.

A valuable feature of the school's work was its summer session conducted at Belle Terre, Long Island, 60 miles from the City of New York. I understand that a large number of attendants at the summer school were teachers.

In concluding this section, the importance of the School of Art with the Technical College should be emphasised. Without this association the Schools of Art in England remained relegated to the leisured amateur, exerting no influence upon industrial training. This weakness has during recent years been remedied, but it still exists in various parts of South Africa. A remarkable illustration of the effect of the separation of Art from Industry in England may be mentioned the fact that English artists design for the industries, but their designs have been used not in England, but in Germany. The executed designs have ultimately found their way back to England in German articles of commerce.

7—Technical Colleges and Research Work

It is a common defect of English Technical Education that very little research work is done in any of its Technical Colleges. This is being increasingly recognised as one of the most serious drawbacks to British industrial efficiency. It is only necessary to mention the dye industry to be reminded of the truth of this statement. Our commercial rivals, Germany and America, have profited by British negligence in this matter.

The British Government has now promised an annual grant of £10,000 for ten years to promote research and technical investigation in connection with the manufacture of aniline dyes.

The need for research has long been recognised in America where manufacturers often maintain laboratories at Technical Colleges, considering money so spent to be a paying investment. An example of this is found in connection with the famous Massachusetts Institute of Technology, which produces a very large amount of research work. Many of its research laboratories are definitely provided for by large industrial firms and corporations. These concerns, which include the Steel Corporation, the Powder Trust, and the Edison Electric Company amongst others, have agreements with the Institute by which they pay the entire expense of maintaining research laboratories which are solely engaged upon problems furnished by the industries represented.

The relations between the Institute and the various industries are of the most intimate character. The consequence is not only that the industries benefit directly by the discoveries made, but the Institute attracts the best kind of students, and these students are sought after by business undertakings when they have finished their courses.

It is evident that the scheme just described is very similar to the proposals which have been made in Durban for the co-operation of the Sugar Industry with the Durban Technical Institute. We seem still to be hesitating whether we are to follow the British method which has been so disastrous to the British industries or the American methods which have done so much to develop that new country.

It is impossible to estimate how much local industries, such as Sugar, Wattle Bark, and various others depending upon applied chemistry, would benefit the carrying out of such a scheme.

How greatly it would add also to the status of technical education in Natal if such training could be given at the Durban Technical Institute! At present the Sugar Industry depends for its technical experts largely upon imported Mauritians and upon the very costly method of sending an occasional young man to the United States to receive his training.

8—The Development of Higher Education among Working Men

In the University Tutorial Classes connected with the Workers' Educational Association we see being realised the aspirations of those pioneers and leaders of the nineteenth century who laboured for the spread of education and culture amongst the great masses of the working class population of Great Britain. The list of these social reformers begins with Robert Owen, who was at work on his scheme in the year 1800, and includes amongst others William Lovett, the cabinetmaker, who founded "The London Working Men's Association," Carlyle, Ruskin, John Richard Green, Frederick Denison Maurice, Charles Kingsley, T. H. Green, Arnold Toynbee, Canon Barnett, and, lastly, Albert Mansbridge, the founder and secretary of the Worker's Educational Association.

I have given the pedigree, so to speak, of the Association so that it may be realised at once that the movement is no sporadic, ill-conceived growth, the work of dangerous agitators, as some to whom I have described the movement have suggested. It is the legal heir to the Working Men's College, the University Settlement and the University Extension Movement, aiming at what these aimed at and succeeding where they have failed.

I was fortunate in my introduction to the movement. While staying with Mr. A. Abbott, M.A., in Yorkshire, I met Mr. J. Dover Wilson, M.A., one of the Board of Education Inspectors, who has been investigating the work of University Tutorial Classes on behalf of the Board. He was able to give me at first hand the history of the present position of the movement, together with an estimate of its value from an educationist's point of view. He further arranged for my visiting the headquarters in London. Unfortunately Mr. Mansbridge was suffering from a breakdown in health and was away when I called, but the Assistant Secretary gave me much information and provided me with an abundant supply of literature bearing on the subject, including an advance copy of the annual report for 1914.

Perhaps it would be of interest if I attempted to give some account of the movement as described to me by Mr. Wilson.

SOME NOTES UPON TECHNICAL EDUCATION.

At the end of last century a clerk, named Albert Mansbridge, was working in a Co-operative Store in the East End of London, near, in fact, to Toynbee Hall. He took great interest in Social and Educational questions and did some speaking and writing, which attracted the attention of Mr. and Mrs. Sydney Webb, who made him their private secretary. Having lived amongst and got an intimate knowledge of the conditions of working people, he now was able to study under eminent authorities the social questions involved. Realising the national importance of the intellectual education of the working man, he saw how limited had been the success both of the University Settlements and of the University Extension Movement. After all their efforts, the working man had not given his confidence to the Settlement workers and the Extension movement had never appealed to working men.

Mr. Mansbridge conceived the possibility of enlisting the help of the Trades' Unions and the Co-operative Societies in making the University Extension movement more completely adapted to the need of the working man. The proposal found support on all sides. A conference of members of Co-operative Societies, Trades' Unions, and members of the University Extension Movement was held under the presidency of the Bishop of Hereford at Oxford in the summer of 1903.At this meeting the Workers' Educational Association was founded. The following are the regulations and aims of the Association:—

The Association shall be known as THE WORKERS' EDUCATIONAL ASSOCIATION. It shall be definitely unsectarian and non-political.

Its object shall be to promote the Higher Education of Working Men and Women.

It shall, in its capacity as a co-ordinating Federation of Working-class and Educational interests, endeavour to fulfil its object in the following principal ways:—

(a) By arousing the interest of the workers in Higher Education, and by directing their attention to the facilities already existing.

(b) By enquiring into the needs and feelings of the workers in regard to Education, and by representing them to the Board of Education, Universities, Local Education Authorities, and Educational Institutions.

(c) By providing, either in conjunction with the aforementioned bodies or otherwise, facilities for studies of interest to the workers which may have been hitherto overlooked.

(d) By publishing, or arranging for the publication of such reports, pamphlets, books, and magazines as it deems necessary.

The feature of the work of the Association which interested me most was the University Tutorial Classes.

A class is formed numbering from 12 to 24 students—working men and women—and placed under the tutorship of a highly qualified University lecturer. It meets two hours fortnightly, and the course extends over a period of three years. The subject for study is generally some social question. Last year, for instance, the following were some of the subjects taken:—Constitutional History, Psychology and Philosophy, Industrial History, Economics, English Literature, the Evolution of Government, Present Day Social Problems, Growth of the English People, Natural Science, History, Biology, Sociology, Modern European History, Political Institutions and Political Thought, and so on.

The time spent in class is divided up so that the first hour is devoted to the lecture, which is sufficiently informal for the students to be allowed to ask questions as the lecture proceeds, and the second hour is devoted to discussion. Every member of the class at its inception gives an undertaking that he or she will attend regularly for the three years over which the course lasts, except when prevented by illness or working overtime. Members also undertake to obtain and to read the text-books and to write regularly once a fortnight an essay which is handed in to the lecturer.

It is very remarkable that these working people who have received only the common elementary school education, many of them having done no serious study at all before, should apply themselves with great interest and success to the study of these abstract subjects. Seventy-five per cent. of the class members as a rule fulfil all the conditions laid down and make splendid progress in the study of the chosen subject. Beginning at first with faulty English and ill-prepared minds, these students generally acquire a thorough command of English in writing their essays, tackling the subjects set in a way that shows ultimately a surprising grasp of the subject. Their work is very carefully scrutinised not only by the lecturer, but by representatives of the Board of Education appointed to examine the classes. The lecturers bear testimony not only to the quality of the work but also to the benefit which they themselves have received from discussing these social topics with the working men. Some say that they have learnt more than they have taught. Most of the lecturers are tutors at the Universities, and so highly do they value the essays which are sent in by the members of their classes that they circulate them amongst their students who are reading for the final honours' degree at Oxford, Cambridge, or elsewhere, with a view to their being studied as texts. They further testify that by the end of the course many of their working-men students have reached a standard of attainment in the subject of study sufficient to place them in the first-class of the final honours' schools of the University. The report of the Board of Education Inspectors is equally emphatic. Mr. Wilson informed me that he was really amazed at the excellence of the work done by the students in the classes which he had examined.

Everyone of the Universities and the University Colleges in England and Wales has given its support to the movement, lecturers being provided by each of the Colleges.

The work of the Tutorial Classes began in 1907, when two classes were formed with a total membership of 60 students. The next year the number increased to eight classes with 237 students. The numbers have rapidly grown, and last year there were 145 classes up and down the country with 3,343 students. It is a remarkable thing that more classes would have been formed if possible, the demand for them outrunning the supply. A considerable number of applications for classes had to be refused, although the Association earnestly wished to see them established. One of the difficulties of the movement is the financial pressure. It may be well to state that the funds are provided in the following way:—The Board of Education, the University and the Local Education Authority, each contribute a share of the cost. The Board of Education promises £30 per annum for the three years for each classl.

A striking proof of the vitality of the Tutorial Classes is that the number of students in them, or of ex-students, who are teaching the subsidiary classes is steadily increasing. In some parts of the country some of the working-men who have completed the courses in the classes go out themselves to conduct further classes in the villages without remuneration, thus devoting their scanty leisure to spreading the influence amongst those who have not been able to join the Tutorial Classes themselves.

It will, I am sure, be readily seen that the work done by these University Tutorial Classes is of inestimable value to the country. The working-men who have been through this course will be able readily to distinguish crude claptrap from sound argument, and from a well-founded knowledge of social affairs and a trained mind will be able to estimate what they hear at its proper value. As time goes on they will be able to contribute largely to the social amelioration of their fellows and to enhance the value of the social efforts put forward by reformers and statesmen.

The activities of the Workers' Educational Association cover a wide field beyond that of the Tutorial Classes. They enlist the sympathies of organisations of working people in the spread of Education generally and in the social questions of the day. The Association forms a Federation consisting at present of 2,555 organisations, including 953 Trades' Unions, Trade Councils and Branches, 388 Co-operative Committees, 341 Adult Classes and Institutes, 65 Teachers' Associations, 151 Educational and Literary Societies, and 451 various Societies mainly of work-people.

In concluding this section I cannot do better than quote the following extract from the general report of the Council of the Association for the year ending July 1st, 1914:—

> "The indirect influence of the Association has been perhaps even more important than its practical activities. It has given a new meaning to the demand for a democratic system of higher education . . . It has offered a practical demonstration of the fact that there is a widespread demand for humane education among the workers both men and women . . . Universities and Education Authorities have learnt from it that what the worker demands is not merely technical instruction, but the opportunities for spiritual refreshment which enable him to be a better man and a better citizen, and that they cannot discharge their own educational responsibilities unless they are in constant consultation with the representatives of those for whom it is their duty to provide education."

9—The Technical College and Vacation Classes

Many Colleges and Universities give Vacation Courses which afford opportunities for advanced, technical or specialised instruction to large numbers of people who would not otherwise be able to get the benefit of the teaching of such institutions. In America such courses also afford a means for students already attending college to anticipate work and thereby to shorten their courses, or to make up deficiencies.

I propose to give a brief account of the Summer School which was in full progress when I visited the University of Pennsylvania last July, and then to indicate the possibilities of doing somewhat similar work in connection with the Durban Technical Institute, naturally allowing for the great difference existing in place and conditions.

At the Summer School in Philadelphia representatives from almost every State of the Union and from a number of foreign countries were in attendance studying under a large body of professors and lecturers, the majority of whom were connected with the University. No small number of their professors were drawn from distant colleges or were experts in their own subjects, specially engaged for the Summer School.

The school was carried on on such a large scale (there were over 800 students) that a special organisation of the Staff was provided. One of the professors was Director of the Summer School, and he was assisted by a special administrative staff drawn from amongst his colleagues. The course of instruction covered an interesting variety of subjects.

Education took a prominent place, and included Educational Research, School Administration, etc.

Other subjects included were:—

Philosophy with a section on Modern Thinkers.
English with sections on Public Speaking, Argumentation, Literature, etc.
Economics, Finance and Commerce.
Mathematics, Science.
Languages, Geography, History, Music and Physical Training.

The session covered a period of about six weeks and lectures commenced at eight o'clock in the morning. For a single course of lectures involving an average of one hour daily the fee was £3. Reduction was made when a number of subjects were taken.

Serious work was done, and students appeared to be deeply interested in their studies. This was encouraged by the Universities and other academic bodies giving recognition to the work done in counting it towards a degree qualification or by the granting of a certificate on completion of the course.

The entertainment of the students was well provided for. Lodgings might be had at a cheap rate at the University. Excursions, visits to places of interest, concerts and popular lectures were arranged, and the tennis courts, swimming pool, club-house, and recreation rooms of the University were placed at the disposal of the students. There is no doubt that they had an enjoyable as well as a profitable time.

Durban would naturally appear to be a most suitable place for the holding of a series of vacation courses in the Winter Season. For about three months of the year people come here from all parts of the Union, from Rhodesia, British East Africa, etc., many from remote towns and isolated farms, where opportunities for pursuing courses of study are very rare or altogether non-existent. Such people would doubtless be only too ready to take advantage of courses in Domestic Science, Art, Music, Literature, Special Courses for Teachers, Popular Lectures, etc.

It may be possible to get special grants from the Government for these classes which would be of great benefit to up-country people. And the Municipality of Durban would doubtless be ready to advertise the courses as one of the Winter attractions of the town. In carrying out the scheme it should be possible to get the valuable assistance of the Natal University College Staff.

As time goes on it should be possible to make a Winter School a regular feature of our work, and we should aim at doing it in the same thorough-going way as the Americans do at Philadelphia.

10—Employers and Educational Schemes

There are many employers both in Britain and America, who have realised that industrial efficiency depends upon the proper technical training of the young apprentice. Some even go farther, and pay great attention to his moral and physical well being. Such employers stand out in striking contrast with the firms who are so short-sighted as only to think of immediate dividends, leaving the responsibility of the future supply of highly-trained workmen and efficient foremen to their neighbours and the State.

The British Government have long accepted the responsibility of acting as model employer, and, as will be presently shown, they have reaped a rich reward in efficiency. But it has been in Germany that the State has seen to it that every apprentice, no matter who his employer may be receives a sound training both in his trade and as a citizen.

I propose to give in this section some detailed account of the steps taken by some of the enlightened employers referred to above.

Coming first to the example of the British Government it should be observed that as far back as 1843, schools for apprentices were established in the Royal Dockyards. In the early days a highly qualified schoolmaster was appointed to each school, and he was assisted in various branches by technical men from the Dockyard or the Admiralty. In the humanising subjects the Naval Chaplain of the Dockyard, a University man, was the instructor. A very effective system of examinations in technical subjects brought the best men to the top. In the humanities the Admiralty appointed men of first rank to inspect the schools. The famous Canon Mozely was well known for the remarkable effect he produced by his visits.

The young dockyard apprentice attends on the afternoons and evenings of two days weekly. Older apprentices attend on a third evening. The more successful students have opportunities for promotion, the highest ranks in the Service being filled with ex-apprentices who have by means of Government scholarships received training at the Royal Naval College. The names of Sir Edward J. Reid, Sir William White, and Sir Philip Watts, ex-shipwright apprentices from the Royal Dockyards, are well known in connection with the building up of the Navy.

The Royal Dockyard Schools have for three-quarters of a century been training the rank and file and all grades of officers in shipbuilding and engineering. It has no doubt been expensive both in time and money, but the result to-day is the British Navy.

The fear has been expressed to me by more than one engineer in South Africa that young men so educated will all be too anxious to be foremen and managers, and few will be content to become skilled workmen. Experience in the Royal Dockyard has shown this not to be the case. Certainly the supply of qualified foremen has never been lacking, but neither has the supply of skilled workmen.

Most of the great Railway Companies of Great Britain have made provision for the technical education of the apprentice in their works. As an example the arrangements made by the GREAT WESTERN RAILWAY COMPANY are described:—

(1) The Company admits a limited number of boys from the Technical Secondary School to a shortened apprenticeship provided they are specially recommended by the School Authorities.

(2) The Chairman of the Great Western Railway Company offers a prize of £10 annually to the engineering apprentice doing best work, and £5 to the junior clerk doing best work at the Technical Classes during the year.

(3) Railway apprentices are required to attend the Technical Institution three evenings weekly.

(4) When apprentices attend regularly three evenings weekly their absence from the Factory before nine o'clock on three mornings weekly will not be recorded against them.

(5) After one year's attendance at Evening Classes 15 apprentices yearly are awarded scholarships entitling them to Day Studentships for three years at the Technical Institution. They attend on two half-days weekly, and have their wages and school fees paid by the Company.

(6) A limited number of apprentices in addition to the above are allowed to attend the Day Classes in the same way, only their fees and wages are not paid by the Company.

(7) Junior Clerks are required to attend the Institution at least two evenings weekly.

SOME NOTES UPON TECHNICAL EDUCATION.

A brief summary of the special provision made by **Messrs. Cadbury Bros., Ltd., of Bournville**, for the education of their apprentices is now given.

Each apprentice's workshop training is systematised by means of Departmental Syllabuses and Trade Examinations, and the following educational facilities are offered by the firm:—

(1) Time off on afternoons for attendance at Classes.
(2) Time allowed in afternoons for home-work.
(3) Apprentices attending late classes in Birmingham are excused from work before 9 a.m. on following mornings.
(4) Trade Classes held at Works in subjects not otherwise provided for.
(5) Financial aid towards tram and train fares incurred in attending classes at a distance.
(6) Part of class fees advanced where these exceed a certain minimum.
(7) Overtime not allowed to interfere with attendance at Classes.
(8) Cheap teas in Works Dining Room before going to classes, the loss being borne by Works Education Committee.
(9) Substantial rewards for good progress, such rewards taking the form of tools or other "educational facility," the term being interpreted liberally.

As an example of special provision being made for factory girls, it may be mentioned that **Messrs. Rowntree & Co., Ltd., of York**, have some 4,000 employees, of whom about 900 are girls, all of whom are required to attend the Domestic School. This school was opened by the firm in 1905 because they felt that young girls coming direct from school to the factory, missed the valuable training afforded by home life. The subjects taught are Cooking, Hygiene, and Dressmaking. Well trained and fully qualified mistresses give the instruction, and the School is recognised by the Board of Education, i.e., it receives Government grants.

Every girl attends the classes for the first three years after entering the works, and she must be present for 2¾ hours each week during working hours.

In the Hygiene Classes special attention is paid to Infant Management, in which the girls are keenly interested, while other scarcely less important subjects receive attention such as the choice of a home, care of the aged, the effect on the health of well-chosen and carefully-prepared food.

In the Dressmaking Classes mending, which forms so large a part of a housewife's duties, is not forgotten, and both household and personal repairs find their place in the Domestic School.

In the Hygiene Classes an intelligent economy is taught, and if in one class the girls have produced an ample and nourishing dinner at 1d. per head, they will see in another what improvements can be made when 2d. can be spent, and how fuel can be economised by cooking in a hay-box.

IN PHILADELPHIA the young employees in the great departmental stores of JOHN WANAMAKER all attend the "John Wanamaker Commercial Institute." This is carried on on the top floor of their magnificent premises in the heart of the city. A regular teaching staff is engaged and instruction is given during business hours. The system was very fully explained to me by one of the organising staff, and I was shown some of the class-rooms.

This great building is arranged as a rectangular block, covering about 6½ acres of land, and having some 12 floors; a huge central hall rises to a great height and some eight or nine floors. Literally, thousands of people could be seen thronging these premises on a business day. Above all this life, on the top floor was to be found one of the most remarkable vocational schools in existence, with its class-rooms, study-rooms, laboratories, "merchandise clinic rooms," gymnasium and rest-rooms.

Mr. Wanamaker regards this business from the point of view of his young employees as a business university, and he has obtained a charter for the institution as "The American University of Trade and Applied Commerce." The "University" included Day Schools for the boy and girl apprentices, and evening schools for the older employees. The whole business is a great commercial museum in which the employees are the observers.

The Curriculum includes the following subjects:—Hygiene, Physiology, Ethics, Logic, Art, Music, Craftsmanship, Accountancy, Auditing, Investments, Finance, Banking. There are seventy odd manuals of Merchandise dealing with the various sections of the Store.

Practical trades are taught such as Dressmaking, Millinery, Shirt Making, Art Embroidery, Upholstering, Carpet Making, Watch and Clock Repairing, etc.

There is a complete scheme of medical inspection and physical training. Extensive recreation grounds belong to the firm, and every employee gets two weeks' summer holidays on full pay.

In connection with the John Wanamaker Commercial Institute, which is the body of younger employees organised for educational purposes, there is not only the Commercial School curriculum, but also systematic and thorough military, athletic and physical culture courses. The Cadet regiments, numbering about 750, have their own military band, and spend two weeks in summer camp in one of the neighbouring States.

In connection with the Medical Department, a valuable report by the Medical Officer shows the elaborate provision made for the health of the employees.

11—The Importance of Vocational Guidance

Some Methods Adopted

Both in England and in America it is evident that a very remarkable amount of attention is being given to the question of Vocational Guidance and Vocational Training. It has been realised that much waste occurs through young people leaving the primary school at an early age and proceeding to unsuitable and undesirable employments while at the same time neglecting their further education. For this reason some of the best efforts of constructive thought are being directed to the question of vocational training and guidance.

I found that in Philadelphia the Public Educational Association had for some years past been carrying on investigation in connection with the education and employment of young people who were leaving school, and the Secretary of the Association gave me several pamphlets dealing with the results of these investigations. It is impossible even to summarise the results here, but a careful study of the pamphlets shows how great and vital are the issues involved and how desirable it is that in an urban community such as we have in Durban, the most earnest attention should be given to the matter.

From the statistics which have been kindly supplied to me by Mr. Dukes, already referred to above under the heading of "Industrial Training," I have extracted the following figures, which afford some indication of the importance and urgency of the case in Durban.

Number of boys leaving Government Schools in Durban last year	213	
Number of these under 14 years	68	or 32%
Number of these under 15 years	163	or 77%
Number of boys who left without reaching Standard V.	69	or 32%
Number of boys who left without reaching Standard VI.	164	or 77%
Number of boys proceeding to higher schools	42	or 20%

We thus have the appalling fact that three out of every four boys who leave the Primary School in Durban do not reach Standard VI., and only one boy in five continues his education beyond the sixth standard.

Passing from the insufficiency of the education received and the occupations taken up, we have the following figures relattng to 158 boys who finally left Durban Schools last year:—

Occupations.	No.	Percentage.
Skilled Trades	40	23.8
Store	8	4.8
Clerks	12	7.1
Messengers	75	44.6
Unemployed	12	7.1
Unknown	21	12.3
	168	

From this it appears that over fifty per cent. of the boys who finally left School last year went to "blind alley" occupations or else did not find employment at all, while under 40 per cent. were known to take up useful occupations.

This same defect was found in Philadelphia, and it has been overcome by requiring every child to attend school until he is 16 years of age, unless he finds employment approved of by the Education Authority, in which case he may be allowed to leave at 14 or later on obtaining certificate to show that he has entered some "regular lawful employment."

In England the matter has been dealt with under an Act of Parliament by which Juvenile Advising Committees have been established. In August I visited the office of the Huddersfield Advisory Committee for Juvenile Employment at the Labour Exchange.

Through the kindness of Mrs. Parker, the very capable Secretary, who readily supplied me with full particulars as to the work of the Committee, I am able to give the followaccount of this typical bureau.

The Juvenile Advisory Committee was appointed by the Board of Trade in 1910, and is constituted in the following way:—

Six members nominated by the Education Committee, consisting of:

Three Head Teachers.
The Secretary of Education.
An Alderman.
A Town Councillor.

Six members representing employers.
Three members representing work-people.
Two other members interested in the welfare of juveniles.

The activities of the Committee are directed in the following channels:—

(1) Obtaining information regarding the qualifications of children.
(2) Obtaining information regarding employment.
(3) Assisting children in the choice of employment.
(4) "After care."
(5) Various other activities, including addresses to teachers, lectures, conferences, advising the Education Committee, oversight of street trading, Parliamentary action regarding employment of children, domestic service, co-operation with employers, showing boys over works, and the establishment of boys' clubs.

The information regarding the qualifications of the children is obtained from the Head Teachers, who fill up a card, forward it to the office two weeks before the child leaves school. On the card is included the report of the School Medical Officer. With regard to employment, information is obtained from employers regarding future prospects and general conditions of employment. Handbooks dealing with the occupations have been drawn up with the assistance of employers and trades' union secretaries. I have copies of some of these handbooks as well as similar publications from elsewhere. A report upon "blind alley" employments has also been prepared.

The parents are invited to meet the Committee when they are advised about employments and also about suitable classes in the evening for their children.

The work of the Committee is furthered by means of posters exhibited in the Schools and Technical Colleges, by voluntary helpers and visitors, etc.

When children are once placed in employment they are not left to their own devices, but are visited by voluntary helpers under the direction of the " After Care " Sub-Committee. The co-operation of all societies and organisations interested in the welfare of boys and girls is secured. Reports are received and considered. Absences from Evening Classes and excessive working hours are dealt with, and it is worthy to note that almost all the developments of the Committee have been suggested by these reports and the various facts brought to light by the visitors.

The Secretary supplied me with various forms, circulars and reports, and I have pleasure in placing these at the disposal of the Council.

Some time ago I read a paper upon Juvenile Employment Bureaux before a meeting of the Durban Retailers' Council, and it was proposed that that Council should establish such a bureaux in Durban. Unfortunately some financial difficulties prevented the Council from carrying out the proposal.

I trust that the Institute Council will be able to take some steps which will lead to the establishment of some Committee which will undertake some activities similar to those outlined above.

12—Technical Education and Municipal Support

Municipalities have peculiar advantages over rural communities for developing technical and other forms of higher education. They have the population and the wealth, and the men of culture and experience who can take the lead. They have the organisation, and they are able to keep in touch with the latest ideas and developments in industrial, social and educational movements.

As the municipalities have the opportunities, so they have the consequent responsibilities in educational matters. There are few towns of any importance in the British Isles and in America which have not now recognised the possibilities and shouldered their responsibilities in these matters. In Britain practically all the modern Technical Colleges are municipal institutions; those of Manchester and Glasgow, Belfast, Portsmouth, Huddersfield, Halifax and Swansea, to name only a few taken at random, are well known. There is a tendency in the larger cities to raise their colleges to University rank and to obtain University charters. During recent years Municipal Universities have been developed in the following cities, either independently or in connection with neighbouring towns:—Aberystwyth, Bangor, and Cardiff, Birmingham, Bristol, Leeds, Liverpool, Manchester and Sheffield.

The same tendency is noticeable in American cities. An account of the remarkable vigour of educational life of the City of Philadelphia is given in an appendix to this report.

A recent Educational Supplement to the "Times" gives an account of the growth of the University of Edinburgh, clearly showing how this great Scottish University owes its existence and almost every one of its many activities to the energetic Municipality, backed up as it always has been by an enlightened body of public opinion keenly alive to the fundamental importance of higher education.

Eight years ago the Municipality of Durban, recognising their responsibility to the rising generation, made a grant which, when added to the Government grant, rendered the foundation of the Durban Technical Institute possible. Seeing the immediate fruit of their expenditure, they soon doubled their grant, and have since renewed it annually. They have also given a small special grant for equipment. In 1911 they gave further evidence of their interest in providing a most suitable and valuable site for the Institute. Thus by means of the assistance given by the Durban Corporation, a foundation has been laid for a Technical College calculated to be of the highest importance to the educational welfare of Durban.

It is impossible to say upon what various lines the Institute will develop in future, and it would be unwise to lay down a far-reaching plan at present. We must be guided by the immediate needs and the possible developments of local industries in the near future. Immediately necessary developments include a School of Domestic Science, a remodelling of the School of Art upon the lines of Applied Art, an expansion of the Day Apprentice School, bringing it into line with the German practice, and the establishment of a Day Training College for Teachers.

It will be our privilege as a Municipality to take a lead in these matters, and it should be regarded as a duty by our City Fathers.

A visit to any one of the Technical Colleges named above would convince the most conservative that we are merely at the beginning of our work in Durban. Professor Perry's criticism in the Report of the University Commission gives point to this, and a glance through the calendar of a modern Technical College will convince the reader that the case is being stated here with the greatest moderation.

I do not think we can hope to equip this Institute properly for all its functions without the further generous aid and continuous sympathy of the Durban Corporation. I hope in addition, that some of the local wealthy gentlemen who have made their money in Natal will come to our assistance with the liberality which has been characteristic of the Americans referred to in various parts of this Report.

13—The Social Side of the Technical College

The Council will remember the valuable Report which Mr. Hemer presented last year after his visit to England and Wales. Not the least valuable of his various suggestions was that relating to the Social Life of the students, and I venture to quote his remarks under this head in full, as they appear to be of considerable importance.

> " It is very noticeable that the Institutes at Home do all in their power to further the interests of the students. Apart from the usual studies, the social side is fully developed. Most institutes have their assembly hall, which in some cases has an organ.
>
> " The Students' Union is a live concern, and from this other social activities develop. There are social and club rooms for men and women, library and reading rooms, a gymnasium, rifle range, refreshment rooms, and a recreation ground. Some of the institutes have orchestras, the members being students, and classes meet for instruction in the playing of wind and brass instruments. There are whist drives, dramatic performances, and dances arranged by the various clubs from time to time, so not only in the academic side of the work are the students proficient, but in physical education, sport, and healthy recreation they do equally well.
>
> " A Principal of one of the Home Colleges reports thus:—
>
> " 'IT IS PARTICULARLY PLEASING TO MENTION THE INTEREST TAKEN IN THE MUSICAL, INTELLECTUAL, AND SOCIAL ACTIVITIES OF THE STUDENTS. IT CREATES AN "ESPRIT DE CORPS" WHICH HELPS MATERIALLY THE SUCCESS OF THE COLLEGE, BY STULTIFYING IGNORANT CRITICISM AND ATTRACTING A WIDER NOTICE AMONGST THOSE WHO MAY BECOME FUTURE STUDENTS.'
>
> " The assembly hall attached to the institutes is very useful. Not only is it used for directly defined institute

work but other bodies hire it at a remuneration. I should like to suggest that the Town Council be approached to consider the advisability of erecting their smaller concert hall as part of our institute buildings, and further that a school orchestra should be established. Students would thus have an opportunity of getting a sound training in orchestral playing, and in the near future if the town orchestra scheme matures, the work done will be of value to these students to fit them to take places in this suggested town orchestra."

14—Some Concrete Suggestions bearing on the Work in Durban

This Report lays no claim to being a complete survey of the present state of technical education in the countries visited, but I hope it will be found of some value as a contribution to the development of this most important branch of education in Natal.

To illustrate the methods of education which have been evolved in the United States, I have described with some detail several American institutions giving technical training, and I have given a brief survey of the Educational System of Philadelphia. These matters are dealt with in the Appendices.

While we are proud of the progress which we have made in Durban, Professor Perry's Report, which is given in an analysed form as an Appendix, shows clearly that we cannot rest where we are with any degree of satisfaction. Both his criticism and the accounts I have given of educational progress in England and America show that we have yet a long way to go before we can consider the Durban Technical Institute in any way complete.

To further the work of technical education in Durban we need

(1) A certain consolidation and re-arrangement of organisation.
(2) A deepening and widening of public interest in the subject.
(3) Increased financial support.

(1) Consolidation and Re-organisation.

It is our aim and opportunity to bring into line and to develop all types of higher education which the community requires. The comprehensive nature of this aim calls for the Council's utmost care and best thought. I therefore venture to make the following suggestions regarding the work of the Council:—

(1) That the present Committee of Studies which now concerns itself little with the academic questions be given a more suitable name, e.g., "General Purposes Committee" or "Executive Committee."

(2) That a new Committee of Studies be formed to deal with academic questions, and that it consists of half-a-dozen members of Council and the Heads of Departments with the Principal as Chairman. (This Committee would consider new schemes of work, courses of special lectures, the question of the development of classes for teachers, the plans for the Sugar School, the School of Music, and so on.)

(3) That, later on, Advisory Committees be formed to include specially suitable members from outside the Council, and to deal with particular branches of the work, e.g., a committee, including ladies, to advise on a Women's Department.

(4) That the name of the Institution be changed to that of Durban Technical College in accordance with the suggestion of the Superintendent of Education and the Technical Adviser.

(5) That a Vice-Principal be appointed.

(6) That an increasing number of members of the Staff should devote their time almost exclusively to the work of the Technical High School, and that more work of a practical nature should be done in this School.

(2) The Deepening and Widening of Public Interest.

The interest of the Public in Educational matters needs to be thoroughly aroused and maintained. Thinking men should therefore study the subject and enlighten public opinion upon its vital importance to the community. To this end there should be formed Education Committees in connection with the Durban Club and other Clubs and Societies, and there should be formed in Durban a Public Education Association for furthering the scientific investigation of the phases of educational work which become important from time to time and for discussing and advancing the best types of education. There needs to be an Association of members of the teaching profession, not only for mutual instruction and improvement, but for holding meetings to discuss special problems and giving the public the benefit of expert opinion upon such questions.

Education should not be left entirely in the hands of officials and councils, but it should be everybody's business to see that the best provision is made for training the rising generation for the future that lies before them. It is a fit subject for the consideration of Trades Unions, Friendly Societies, Chambers of Commerce, Retailers' Councils, and every body of men and women which prides itself of its public spirit.

(3) Increased Financial Support.

Technical Education is expensive. But there is no worthier subject for the expenditure of public funds or private benefaction.

The great Municipalities at Home and in America have built their own Technical Colleges and Civic Universities. The Corporations of Edinburgh, Leeds and Liverpool each contribute annually over £10,000 to these institutions.

If the whole cost of technical education is left to the Central Government there is likely to be a loss of individuality and efficiency in the local institutions.

Merchant princes all the world over, and particularly in America, have given their aid and support to the establishment and maintenance of technical colleges. Many such institutions in America have been built and completely endowed in this way. Attention is directed to the various appendices describing American institutions which illustrates this.

There is ample scope for the benevolence of our wealthy citizens in connection with this Institute—the Large Hall, the Sugar School, the Library, the Museum, a Gymnasium, and the equipment of Laboratories and Workshops are all matters which are greatly in need of funds for their establishment and extension.

It is our aim to make every branch of the work of the Institute thoroughly efficient and to establish further branches of work with a view to providing adequate facilities for all the various needs of the community as they arise. We must not stop short of that. There are unusual opportunities in Durban, and it behoves us to take the best advantage of them.

15—Acknowledgement

It is difficult to acknowledge all the assistance received in connection with my observations and the drawing up of this record of them. As far as possible this help has been mentioned in the body of the Report.

I desire to express my gratitude to all those heads of institutions, teachers, secretaries and others in Britain and America who have so readily helped me in my investigations. Particularly I owe my thanks to Mr. A. Abbott, M.A., H.M.I., whose kindness enabled me to spend such a profitable week visiting technical institutions of all types in Yorkshire, and to Mr. H. E. Jones, B.A., the Senior Member of the Staff of this Institute, who has given me valuable suggestions while I have been drawing up this Report, and who has kindly read it through before it assumed its final form.

I have the honour to be, Gentlemen,

Your obedient Servant,

B. M. NARBETH, B.Sc. (Wales),

Principal.

DURBAN.
29thApril, 1915.

*** I have also to acknowledge the kindness of Mr. Percy Coleman, M.A., who, since the above was written, has read through the manuscript, and offered some valuable criticisms.
B. M. N.

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The South African University Commission Report, 1914.

Analysis of

PROFESSOR PERRY'S REPORT upon the Laboratory Work of the Durban Technical Institute.

(See Report of the Commission, Page 140.)

FAVOURABLE CRITICISM.

"The BUILDINGS are very good."

"The ROOMS . . . . are spacious and satisfactory."

"In spite of the want of apparatus and other equipment the apprentices attending this school are getting INSTRUCTION which must be OF GREAT VALUE to them."

"MECHANICAL DRAWING is well taught."

"PRACTICAL MATHEMATICS is particularly well taught."

ADVERSE CRITICISM.

"There is very little APPARATUS for any kind of experimental work."

"It may be almost said that there is no LABORATORY WORK in pure or applied science."

"There are WOOD WORK SHOPS with some vices for iron work in a makeshift building some three hundred yards away."

"The two TEACHERS to whom I spoke are underpaid and fearfully overworked."

SUGGESTIONS.

"Some cells and a converter enable EXPERIMENTS to be made in electrical work."

"There must be much greater EXPENDITURE OF MONEY before this school . . . can be as useful as any of the numerous schools which have been established in Great Britain with the same object."

"The governing body of such a school is usually not alive to the fact that competent teachers must not only have knowledge, they must have common sense and experience, and they cannot be obtained at small SALARIES. A good teacher engaged at a small salary will quite quickly get a better appointment, an incompetent teacher will perforce stay."

Some Notes on the Educational System of Philadelphia

21st July, 1914.

Philadelphia as one of the oldest and yet most progressive cities of the United States and having its own School System afforded a fertile field of study of educational organisation and methods.

I was in the city in the month of July, and although many institutions were not in session the leading officials of the Board of Education and the Public Education Association and some of the principals of the schools and colleges were available and showed themselves most ready to meet me and to discuss educational affairs. Some institutions such as the University of Pennsylvania and the Williamson Trades School were still at work. The Superintendent of Schools (analagous to our Superintendent of Education) had just retired in order to enter political life, but his deputy, Dr. Corner, granted me an interview and gave me literature as well as authority to visit the Schools.

In Pennsylvania the Commonwealth is responsible for Education. The State is divided up into a number of districts, each of which has its own Board of Education authorised to levy taxes and to administer the system. But voluntary effort is responsible for a great deal of the efficiency and development of the school system and the endowment of technical and higher education. On the one hand there are the Public Education Association, the Home and School Leagues and Educational Committees of the various clubs of the city, and on the other there are such institutions as the Drexel Institute, Gerard College, and the Williamson Trade School, which have been founded and endowed by private benefaction.

I propose to give first a brief account of the Public School system as controlled by the Board of Public Education of the School District of Philadelphia, and then to refer to the voluntary associations and privately endowed institutions.

The Board of Education which meets monthly consists of 15 members appointed by the Judges of Courts of Common Pleas for a term of six years.

SOME NOTES UPON TECHNICAL EDUCATION.

This Board is required to establish, equip, furnish and maintain a sufficient number of public elementary schools to educate every person residing in the district between the ages of six and twenty-one years who may attend, and the Board may establish and maintain practically all other kinds of schools and institutions giving higher, technical, scientific and agricultural education, as well as Libraries, Museums, Reading Rooms, Gymnasium, Playgrounds, special schools for the Blind, Deaf, Mentally Deficient, Truants, Parental Schools, Schools for Adults, Public Lectures, etc. It will thus be seen that the American School System comprehends much social work beyond the instruction given in the class-room. It will presently be seen that the Board of Education, backed by strong public opinion, interprets its functions very liberally and provides in many ways for the social well-being of the population.

FINANCIAL MATTERS.

The Board levies annually a school tax of not less than five or more than six mils on the dollar of the total assessment on all property within the district. (.05 to .06 of 1d. in the £.) It may create permanent loans—within defined limits—for capital expenditure and it may create a smaller, limited temporary loan. The Board also receives a State Appropriation (i.e., Government Grant), one-half based upon the number of paid teachers regularly employed and one-half on the number of children between the ages of 6 and 16 *resident* in the district.

The Board must every year present an estimate of expenditure for the current year, and it must not depart from the apportioning of funds shown in the estimates except upon a vote of two-thirds of their number.

The following table gives in round numbers the Revenue and Expenditure for the year 1912:—

RECEIPTS.	£
Taxes	1,411,320
State Appropriation	192,690
Temporary Loan	100,000
Miscellaneous	17,400
	£1,721,410

Population, 1,800,000.

Compare Birmingham £777,700 for population 830,000.
„ Munich £600,00 „ 600,000.

EDUCATION SYSTEM OF PHILADELPHIA.

SALARY SCHEDULE (TEACHERS.)

ELEMENTARY SCHOOLS.

	£		£		An. Inc.
Kindergarten	120	rising to	150	by	£3
Primary	120	,,	180	,,	6
Grammar (Men)	160	,,	260	,,	10
(Women)	140	,,	200	,,	6
Teaching Principals—					
Primary	140	,,	220	,,	6
Unit	160	,,	260	,,	6
Supervising Officials—					
Primary	260	,,	320	,,	6
Grammar or Unit	420	,,	500	,,	8

HIGHER SCHOOLS (Including Trade and High Schools).

	Men.	Women.
Asst. Instructor	£160—£200	£120—£160
Instructor	£250—£290	£160—£210
Asst. Professor	£300—£380	£240—£280
Professor	£420—£500	
Head of Department	£520—£600	£290—£330
Principal	£700—£900	£400—£500

THE SCHOOL SYSTEM.

The Board of Education is required by Law to make provision for the education of all persons in the School District between the ages of six and twenty-one. As a matter of fact attendance is enforced on all between the ages of eight and fourteen, and unless the child be legally employed, between the ages of fourteen and sixteen. Provision is made for children under five. Beyond the Kindergarten stage there are 14 grades, each corresponding to a year of school life. These are taken in the different departments in the following way:—

(1) Elementary School—

Kindergarten, age 5 and under.
Primary School, Grades 1—4, ages 6—9 or 10.
Grammar School, Grades 5—8, ages 10—13 or 14.

(2) High School, Grades 9—12, ages 14—17 or 18.

(3) Normal Training, Grades 13 and 14, ages 18—20.

THE PUBLIC SCHOOLS OF PHILADELPHIA.

The following table shows the number of Schools of each kind in the School District for the year ending 30th June, 1913:—

	No.	No. of Pupils.	Teachers.	Av. No. in a Class.
Normal School (Girls), 1 ...	2	715	45	16
School of Pedagogy (Men), 1	2	79	6	17
High Schools (Boys), 4	7	6,589	251	21
(Girls), 3	7	6,909	286	20
Trades School (Boys), 3 ...	1	274	13	18
Elementary Schools	220	160,351	3,765	40
Kindergartens	244	8,449	244	27
Special Classes for Backward Scholars		1,037	56	
Special Classes—Disciplinary		568	30	
Public Industrial Art School		1,373	13	

EVENING SCHOOLS.

Evening Schools are carried on in some 24 School Buildings, namely:—

4 High Schools.
2 Trades Schools.
18 Elementary Schools.

381 teachers are engaged.

The instruction does not seem to be highly organised as in Great Britain. Students take individual subjects instead of courses.

The number of enrolment for 1913 was 16,634
Average attendance 7,408

This compares unfavourably with our own and English returns, for the percentage is about 45 per cent.

The figures for the different kinds of schools are as follows:—

	Enrolled.	Av. Att.	Percentage.
High	6,014	3,117	51.8
Trades	1,484	513	53.1
Elementary	9,136	3,778	41.3
	16,634	7,408	45.0

SUBJECTS TAUGHT.

The Evening High Schools teach English, Modern Language,s Mathematics, Science, Drawing, Commerce, Domestic Economy and Physical Training and Hygiene.

The Evening Trades Schools teach Mathematics and Drawing and the following Trades:—

Plumbing	354 enrolled.
Electrical Construction	315
Sheet Metal	147
Carpentry	100
Printing	82
Sign Painting	64
Bricklaying	31

The Evening Elementary Schools are mainly engaged in teaching English to foreigners.

With regard to Fees a departure has been made from the usual system of free education which obtains in the State. A registration fee of half-a-dollar in Elementary and one dollar in Higher Schools has been made with a view to steadying the attendance. This fee is returnable to students who make two-thirds of the possible attendance.

SPECIAL SCHOOLS FOR DEFECTIVES.

In Philadelphia much attention is given to the care of children who are physically, mentally or morally defective or abnormal. Special classes or schools are provided for:—

(a) The anæmic, under-nourished and tubercular children.
(b) Crippled children for whom special provision is made for travelling.
(c) The delinquent.
(d) Pupils of low mentality.

Strikingly important results have been obtained in the improvement in mental and physical condition of these pupils fully justifying the extra expense incurred. Many attain in a short time the grade of work normal to their age. " A world of knowledge and enjoyment has been opened up to them, and, in some cases useful employment and partial if not complete self support made possible."

SPECIAL SUBJECTS OF INSTRUCTION.

For Music, Drawing, Household Economy and Physical Training special Directors and staffs of Organisers and Teachers are employed.

1. MUSIC.—There is a Director, 18 assistants and two special teachers. In the elementary schools 12 minutes daily are devoted to music in the class-room. In higher schools an hour lesson weekly is given. Glee clubs and orchestras are fostered in the schools.

2. DRAWING.—There is a Director and 10 assistants who supervise the instruction given by the class teachers.

3. HOUSEHOLD ECONOMY.—There is a Director and an assistant and there are about 150 special teachers.

4. PHYSICAL TRAINING AND FITNESS.—Great importance is attached to the physical welfare of the rising generation. This is shown by the attention given to:—

Medical Inspection.
Physical Training.
Athletics, including Swimming.
Playgrounds and Recreation.
School Gardens.
School Luncheons.

The work organised under each of these heads is thoroughly well done, and large well-trained staffs are employed. Some details are given below in order to show the extent and thoroughness of each.

MEDICAL INSPECTION.—Medical Inspection is provided for by the School Code at the expense of the Board of Public Education under the Department of Public Health.

Three hours each day of the week for 200 shcool days are given to the work. There is one medical inspector for every 3,200 school children and one nurse for 3,000.

The annual cost of medical inspection and treatment amounts to about £14,000 or 1/7 per child.

In addition to this, special attention is given to the care of teeth—oral hygiene. The City Council equipped a municipal dental dispensary. A corps of 200 dentists volunteered for the service and clinic with three chairs has been established. The Board of Education also established three dental clinics in different parts of the city with a service of 12 dentists. Special schools are provided for the deaf and the blind and the tubercular and anæmic are cared for in open air classes. Crippled children are conveyed to school in special vehicles.

Lastly, under this head must be mentioned the Psychological clinic held daily at the University of Pennsylvania for the examination of exceptional children brought them by school nurses and teachers.

PHYSICAL TRAINING.—A large staff of specially trained instructors teach or supervise the physical training given in connection with every school. There are specially equipped gymnasia, school grounds and athletic fields. Special attention is paid to this in the evening schools.

ATHLETICS.—The same thoroughness in organization is applied to athletics, which include soccer, base ball, captain ball, swimming, cross-country races and rowing.

PLAYGROUNDS.—A number of playgrounds are controlled by the Board of Recreation, a department of the City Government, while a smaller number are maintained by the Playgrounds Association. It is not necessary in a town like Durban to give so much attention to this matter as it is in a big city like Philadelphia, but we are living in the early days of Durban when we should see to it that ample space is now allotted to the school playgrounds as a provision for the time when Durban becomes a larger city.

SCHOOL GARDENS.—There are nine special school gardens in the City which are visited regularly by classes from the various schools. The children receive lessons in nature study, elementary agriculture, and do practical garden work. The classes are also supplied with material for nature work and for drawing. Packets of seeds and young plants are supplied from these gardens for cultivation by the children at home, in the school plots and in the kindergarten gardens. The home gardens receive regular inspection from the teachers.

SCHOOL LUNCHES.—School lunches are provided in a limited number of elementary schools and in all the high schools, but different systems of control apply.

(1) Lunches are served in nine of the elementary schools at a cost of five, three or even one cent each (one cent approx. ½d.) about 502 of the children in these schools take advantage of the system. The meals are made attractive so that the itinerant vendors of unwholesome foodstuffs may find no purchasers.

Observations made in co-operation with the Psychological Clinic of the University indicate that the children attending school lunches show marked physical ggain and mental improvement.

In these elementary schools the feeding is managed by a number of philanthropical organizations.

(2) In the higher schools a regular staff is employed in providing the lunches under the Board of Public Education. At each school an "assistant director" has charge, who is a trained dietician and a graduate in domestic science. Wholesome food is provided and each contains the correct food ingredients. A meal may be had by the scholars at a price varying from four to ten cents and by the school staff to a cost of fifteen cents. The meals are served by the students who volunteer for the work and receive a ten cent lunch in reward.

Other activities of the educational authority, including social centres, libraries, periodicals and public lectures cannot be described without unduly lengthening this Report.

VOLUNTARY EFFORT IN EDUCATION.

There are numerous privately endowed educational institutions in Philadelphia and neighbourhood, such as the Drexel Institute, the Williamson Free School of Mechanical Trades, the Franklin Institute, Gerard College, which provide various types of vocational and higher education.

The first two of these are described in separate reports. Private munificence is responsible for a very large share in the educational efficiency of the United States. Upon this efficiency the wider efficiency of the nation ultimately depends. This is recognised by the wealthy citizens who bestow their gifts during their lifetime and so see their own aims carried out.

Voluntary effort is shown in an equally important way in the work done by various organisations which initiate reforms, direct public interest, and in many ways co-operate with the Board of Education. Such organisations include the Public Education Association, the Home and School League, the Educational Committees of the various City Clubs, such as the Civic Club, the Philomusian Club and the New Country Club, together with some half-dozen associations or clubs of teachers.

The good work done by these bodies is warmly appreciated by the Board of Education, as the following quotations from the Annual Report of the Superintendent of Education for 1913 shows:—

> (1) "I wish also to record the valuable assistance of the Public Education Association in making scientific investigations of important phases of educational work. They more than any other agency, have pointed out the practical means of instituting here vocational education and vocational guidance for our people. I am personally deeply indebted to them for certain studies which they have made, without cost to your Board, and I wish to commend to your notice the earnest and intelligent interest of this association."
>
> (2) They have been organised as a special section of the Teachers' Association for mutual instruction and improvement, have conducted classes . . . have held meetings for the discussion of special problems . . . have arranged public meetings to afford a broad survey, not only of the educational bearings, but of the social implications of their problems . . . a survey of interest to both the special and the regular class teacher and the general public.

Visits to the Drexel Institute, Philadelphia

July, 1914.

The Drexel Institute is a Technical College providing a wide range of instruction in Technology, Commerce and cultural subjects. It is not a government or state-aided institution, but owes its foundation and endowment entirely to private enterprise. In many ways its work resembles that of the Durban Technical Institute, and it shows what can be done by an independent institution, when generously supplied with funds.

My visit occurred when the Institution was not in session and when a newly-elected president was about to introduce a new scheme of organisation. Owing to the kind interest of some of the officials, however, my visit proved most profitable, and I am able to present a fairly full report upon the activities of this important institution. The principal executive officers include a President (principal), Dean, and Director of Evening Classes and a Registrar. In the absence of the President I was received by the Dean, Dr. Rowland, who laid himself out to give me every information, afterwards passing me on to the Director of Evening Classes, who was equally obliging, and who showed me round the building.

FOUNDATION.—The late Anthony J. Drexel, a famous American banker and partner of the late J. Pierpont Morgan, decided to found an institution in which young people of both sexes could obtain an education in art, science and industry. In this he was encouraged and advised by his friend, George W. Childs, the famous philanthropist. To the scheme he devoted a sum of $3,000,000 (£600,000), of which one-third (£200,000) was spent on the original building and the remainder set apart for the permanent endowment of the Institution.

THE BUILDING, which was completed and opened in 1891, is a handsome structure, containing class-rooms, laboratories, workrooms, workshops, an auditorium to seat 1,500 and provided with a magnificent organ, a well-stocked library, a museum, a picture gallery and a gymnasium.

A beautifully decorated portico leads to a spacious entrance hall, the ceiling of which is supported with pillars of red marble. Beyond this is the central court or quadrangle 65 feet square and extending to the entire height of the building (four storeys), the ceiling being a skylight of stained glass. Broad galleries which surround the central court give access to the various class-rooms, corridors, etc. The whole scheme gives an atmosphere of beauty and good taste, and conveys to the student on entering a sense of the dignity and attractiveness of learning, and must engender in him a feeling of respect for the institution and for himself as a student.

SOCIAL LIFE.—Before describing the technical work of the Institute I should like to refer to the provision made for the social life of the students and the general means of culture which are offered.

The organ is used at the morning assembly at which the whole Institute meets once each week of the school year, and for the series of free public concerts given on Thursday nights throughout the winter. A series of free publio lectures is given in the Auditorium.

The Museum, which is open to the general public, contains collections of textiles, furniture, ceramics, wood carvings, ivories, prints, engravings, metal work, embroideries, etc.

The Library contains over 40,000 books and 3,700 pamphlets, covering scientific and technical works as well as general literature. There is a reading-room which is supplied with about one hundred and fifty periodicals, and there is also the G. W. Childs' collection of manuscripts of famous authors, including some of Dickens and Thackeray.

The Picture Gallery contains two collections of pictures comprising many examples of modern masters, bequeathed to the custody of the Institute for the use and pleasure of the people of Philadelphia.

Recreation is amply provided for at a fine country estate named Runnymede, belonging to the Institute. It is distant about half-an-hour by train from the main buildings, and gives splendid facilities to both men and women students for sports and out-door life. All the usual athletic games are played by the students.

Finally there is a large and well equipped Gymnasium in the main building.

COURSES OF INSTRUCTION.

The founder had particularly in view men who had been irregularly educated and boys who had not pursued the ordinary high school course.

Day Classes were therefore established covering a three year course up to the standard of College entrance as provided by the High Schools (i.e., Matriculation Standard), but in practical engineering subjects as well as English.

But these students wished to go further at the end of the course, and therefore a four year course of College grade was provided by the Institute, for since these students had not studied along the ordinary high school lines, they had not been suitably prepared for the ordinary College course.

Now, the boy who took the ordinary High School course with a view to qualifying in engineering did not start his engineering until his seventh year after leaving the Grammar School. That is he spent four years at the High School and two years at College, and then in his third year at College he specialised in Engineering. There are, however, many men who find such a course impracticable. In fact, they would never do the ordinary High School course at all. The Institute then made provision for these in its four year College courses.

The Institute has hitherto been in the habit of granting certificates to its graduates, but these certificates have been found of little value outside the neighbourhood where the Institute is known. Power has now been obtained for the University Commission (which body has State authority to recognise degree-granting institutions in Pennsylvania—there are some 15 such institutions thus recognised) to grant degrees in Engineering.

Evening students are to be allowed to enter for degrees, but they must pursue an adequate course which will cover a period of 13 years. A number of such students have come forward and are prepared to enter upon such a course.

The work of the Drexel Institute is pursued in three regular courses:—

1. ENGINEERING.

> "*Men* are trained for the industrial demand for Engineers with powers gained from a thorough knowledge of the general principles that underlie all engineering."

2. DOMESTIC SCIENCE AND ARTS.

> "*Women* are trained for the industrial demand for women who can practice, superintend, and teach the industries known as domestic science and arts."

3. COMMERCIAL WORK.

> "Both *Men and Women* are trained for the industrial demand for secretaries well equipped in the broader requirements of secretarial work, as well as in stenography."

4. ART.

Formerly an Art School was included but this was given up as there was already an efficient school in existence.)

1. THE ENGINEERING SCHOOL.

This school furnishes three distinct courses:—

(1) A three year course of high school grade (or Secondary Course in Engineering).

(Admission by presenting a certificate of graduation from an approved grammar school.)

(2) A four year course of College Grade.

(Admission by presenting:—

(a) A certificate of graduation from an approved high school, or

(b) 14½ approved admission units.)

(3) Normal course in Manual Training (2 years).

(Admission as 2, above.)

(i.) THE SECONDARY COURSE IN ENGINEERING.

This is a three year course, intended for men of maturity and practical experience where education has been irregular and has not extended much beyond the elementary school. The training given deals with such engineering topics as do not require a college preparation for this proper understanding but a knowledge of which can be put to immediate use by a wage earner. The course is supplemented by a sufficient amount of Mathematics, English, Chemistry, drawing to enable "graduates" if they so desire to proceed to the College course. The course is not specialised in any one branch of engineering, and it is so planned that a man who has to leave at the end of the first year will find the training he has received of great use in practical life.

In this Secondary Course two points are notable:

(1) Much attention is given to the teaching of English.

(2) Trades are not taught.

(ii.) THE COURSES OF COLLEGE GRADE. (DAY.)

These include:

(a) The four year course in Engineering.

(b) A three year course in Chemistry.

(c) A three year course in Architecture.

It is in connection with course (a) that the Bachelor's degree in Science is awarded. In all courses the first year, called the adjustment year, is devoted to the study of Physical Science, Mathematics and English. These subjects are given further attention in the subsequent years along with the technical work.

(iii.) THE NORMAL COURSE IN MANUAL TRAINING.

This is a two year course open to those who have completed a High School course or its equivalent.

Curriculum:—

First Year.—Workshops (Wood Shop, Machine Shop and Forge Shop), Drawing, Mathematics, English, Applied Physics and Physical Training.

Second Year.—Shops, Drawing, Educational Methods, Special Methods and Practice Teaching, Mathematics, English and Physical Training.

In order that a Diploma may be obtained, the student must have had practical shop experience. This may usually be obtained during the summer vacation.

2. THE SCHOOL OF DOMESTIC SCIENCE AND ARTS.

In addition to drawing upon the general staff of the Institute for English subjects, Mathematics, Pedagogy and various sciences, this department has a special staff of 14 instructors, including one for Domestic Science, one for Domestic Arts, four for Home Economics, four for Sewing, three for Millinery and one for Institution Cookery.

The classification of subjects under the heading of Domestic Science and Domestic Arts seems peculiar and is as follows:—

Domestic Science.—Cookery, Institution Work, Marketing, Sewing, Laundry Work, Invalid Cookery, Home Nursing, Housekeeping and Domestic Sanitation.

Domestic Arts.—Designing, Hand and Machine Sewing, Dressmaking, Weaving, Dyeing, Basketing and Millinery.

Courses are provided in the following way:—

(a) Three courses of "College Grade."
(b) Secondary School Course.

(a) COURSES OF COLLEGE GRADE.

1. The Two Year Normal Course in Domestic Science and Arts for High School graduates who desire to teach these subjects, also for manageresses of institutions and for those who wish the best equipment for this on home life. Diplomas are granted on completion of this course.

2. The One Year Housekeepers' Course for training mature women as school matrons, housekeepers in institutions, tea-rooms, etc. Certificates are granted for this course.

3. The Extension Courses in separate subjects: Cookery, Sewing, Millinery or Dressmaking. Certificates of attendance are given on the successful completion of these courses.

The Courses and Syllabuses under these three headings appear to be very sound and should enable the Institute to turn out thoroughly competent graduates.

(b) SECONDARY SCHOOL COURSE.

Is intended for girls who have completed the Grammar School Course (i.e., Standard VII.).

3. COMMERCIAL WORK.

The Institute provides Day and Evening Courses in Commercial Education. A suite of large, well-equipped rooms is devoted to this section. The scheme though not conceived on the broad lines laid down in the schools on the Continent of Europe deals thoroughly with

Bookkeeping and Accountancy.
Stenography and Typewriting.
Real Estate and Conveyancing.

THE EVENING CLASSES.

Seem to be organised in a very similar way to those of the D.T.I. Seventy-four different courses are taken, and last year 1,700 students enrolled.

The following aims are set out for these classes:—

1. To provide special Technical Training.
2. To complete an unfinished education particularly for those desiring to qualify for entering the advanced day courses.
3. To supplement previous education filling gaps revealed by experience.
4. To obtain a fairly complete education along engineering terms.
5. To parallel Technical Day School Courses.

FEES.—Unlike the schools maintained by the State and some of the voluntary institutions, the Drexel Institute charges fees, which, however, are quite moderate in amount.

For Day Courses the Fees are as follows:—

College Courses.

Tuition	$100 p.a.	
Extras, including Athletics, Physical Training, Books, etc.	40	
	$140	£28 p.a.
Additional for Laboratory and Domestic Courses	20	
	$160	£32 p.a.

For Evening Courses.

£2 for 1 evening weekly per annum.
£3 „ 2 „ „
£4 „ 3 „ „

EMPLOYMENT BRANCH.

An interesting feature of the work is the fact that the Institute is able to secure employment for its undergraduates during summer terms whereby some of them more than earn the cost of their year's education.

For the Summer, 1913,

Average time worked per Student was 11 weeks.

Average wages $14 weekly, highest $45, lowest $7.

The Cooper Union

For the Advancement of Science and Art, New York.

The following brief account of Cooper Union is given to afford a further illustration of the public spirited interest shown in Education by the wealthy Americans.

This institution, which was described to me as a "Trades School," comprehends a liberal curriculum in Science and Art. Its scope is partly indicated by the following list of departments with the enrolment for each, for the session 1913-1914:—

Night School of Science	1,409
Night School of Art	1,212
Day School of Technical Science	274
Art School (Women)	362
School of Stenography and Typing (Women)	49
School of Telegraphy for Women	21
Debate and Elocution	237
	3,564
Number of Day Students	706
Number of Evening Students	2,858
	3,564

HISTORY.—Peter Cooper, "a mechanic of New York," in 1859 erected the original building at a cost of £126,000. He endowed it with £60,000 and spent further £15,000 on the building. At different times the children and grandchildren of Mr. Cooper have contributed a total of £278,000 in eight different amounts to the building and endowment funds.

In 1899 Mr. J. Halsted died and left £83,000. In 1899 Mr. Andrew Carnegie gave £60,000 to provide for the establishment of a Day Technical School, and in 1900 the Day Classes opened with 20 students. Additional expenses were consequent, and Mr. Carnegie gave another £60,000 to provide the additional endowment required.

The growth of the work involved further expense, and a modest citizen of New York made an anonymous gift of £50,000 for the purpose.

In 1903 the Mayor of New York raised a memorial fund of £43,560, and in 1908 Mr. D. W. James left £20,000 to the Institution. Thus in round numbers a sum of £800,000 has been voluntarily contributed to the funds of the Institution.

The Trustees wish to make further extensions, and are appealing for £270,000 to enable them to accommodate 5,000 students.

TRUSTEES AND OFFICERS.

President, Secretary, Treasurer, five Trustees (who included Andrew Carnegie and J. Pierpont Morgan), Director, Assistant Secretary, five Honourable Associates of the Trustees (Ladies), together with an Advisory Council of Ladies for the Women Students, having its own President, Chairman, Secretary, Treasurer and 37 members, and an Advisory Council of the Men's Night Art School (three women and men), also three Directors of the Museum of Decorative Arts.

STAFF.

5 Professors, 5 Assistant Professors, 12 Instructors, 10 Laboratory and Lecture Assistants; 32.

Additions for Night Classes, 30 Instructors, 25 Night School of Art (Men); 55.

15 Day School of Art (Women).

2 Instructors, School of Stenography and Shorthand, 2 School of Telegraphy, 1 Elocution School; 4.

FINANCE.

No Government or other public grants. Ordinary income from endowments (mainly), £37,000.

Extraordinary receipts for the year:—Mainly legacies added to Endowment Fund, £24,000.

N.B.—(i.) Two smaller but interesting sources of revenue:—

(1) Rents of Large Hall, £1,557.

(2) Students and Gradutes Fund, £80. ($391.)

(ii.) All tuition is free. Chemistry deposits only.

ASSETS.

Total £834,000; value of buildings and equipment, £195,000.

A Successful American Trades School

The Williamson Free School of Mechanical Trades

Whatever opinions may be held upon the subject of Trades Schools, there is no doubt that the Williamson Free School of Mechanical Trades, Pennsylvania, succeeds in turning out young men who are both well trained mechanics and good citizens at the same time; that is to say, it fully accomplishes its aim and performs a valuable function in Society. In fact, a well-known Belgian authority, Professor Buyse, after visiting the School, stated, "The Williamson School eclipses all similar institutions in Europe."

The School is three quarter hour's railway journey from Philadelphia. On alighting at the Williamson School Station one sees the school buildings situated in their own grounds of almost 100 acres. The central building, which is used for class-rooms and offices, is a well designed and dignified looking structure. Grouped round it are the various workshops, residences, etc., and some short distance away are the farm buildings. Ample provision is made for training in the following trades:—Bricklaying, Carpentering, Operating Engineering, Machining, Patternmaking and Farming.

The School was founded in 1891 by a Mr. Williamson, who made over an endowment of £400,000. The institution thus has ample funds at its disposal for carrying on the work in the way which the management may consider fit. There are no extraneous restrictions. The School is therefore well staffed, well organised and well equipped, and the buildings and equipment are constantly being added to by the senior students who do much remunerative work in this way.

The School provides free instruction, together with free board and residence, for about 180 students.

The cost per head per annum is surprisingly low, amounting to about £67, of which about £40 covers board and lodging and £27 education.

In the entrance hall the following quotation from Dr. Arnold, of Rugby, posted on the wall, catches the eye:—

> "It is not necessary that this School should be a school of 300 or 100 or 50 boys, but it *is* necessary that it should be a school of Christian gentlemen."

The School thus sets out with a high ideal, and the salutary effect of this high ideal is soon noticed by the observant visitor who is struck with the good tone in the place.

In arranging the curriculum, the whole man is considered, and with this end in view the time table includes English Language and Literature, Vocal Music, Physical Training and Civics. At the same time the efficiency of the trade training is unquestionable. On completing the three-year course at 20 or 21 the men have no difficulty in securing work, and they get good wages. Not only are they well skilled, but during the second and third years of the course they work under a bonus system which trains them in working with rapidity. The average wage of the class which graduated in 1913 was $18.3 weekly—approximately £3 12s. Practically all the men who leave (98 per cent.) commence wrok immediately as journeymen at the trades they have learnt at the school.

The School is controlled by a Board of seven Trustees. The executive officers consist of a President, a Director, and an Assistant Director, neither of whom engages in the work of teaching. The teaching staff consists of seven trade instructors and seven teachers of the academic subjects—all of the latter being ladies.

The clerical staff numbers four—a private secretary to the president, a stenographer, a stock clerk and a general clerk. The household corps includes a steward, a head matron and ten matrons, and a housekeeper. There are also a baker, a dairyman and two working engineers who are on duty alternately day and night. The total paid staff numbers 73. It is therefore very remarkable that the running cost of the establishment does not exceed the low figure mentioned above, viz., £67 per head p.a. While this sum includes all charges that have to be met by the institution, the amount is no doubt considerably reduced by

(1) No interest having to be paid and no other allowance having to be made for capital expenditure.

(2) The institution having a tendency to be self-supporting because of the remunerative work done by its students in shop and farm.

The mechanical teachers are all men who have mastered their respective trades; they have passed through the shops themselves. They are men of good general education who are thoroughly acquainted with the theoretical principles of their trades. Naturally such men are difficult to obtain, and I discussed the question of supply with the President. He is now devoting special attention to this question and is developing a section in connection with the School with the object of training such teachers. In order to keep the teachers of the School well up in the development of their trades they are given opportunities from time to time of visiting outside shops, and naturally these men read the current literature relating to their trade subjects. Every trade has its own special teacher and good salaries are given.

As the School is entirely free and as the instruction is now recognised to be thoroughly sound, no difficulty is found in the matter of the supply of students. In fact the School is able to be very careful in the selection. As it is considered that the boys under 16 are insufficiently developed physically and mentally to learn a trade, no boy is admitted under that age. In fact a preference is given to youths of 17 or 18 years of age. A three years' course is then given, during which time attention is paid to physical training, so that at the end of the apprenticeship the pupils are sufficiently developed mentally and physically to do men's work and to merit men's pay. At the age of 17 the average youth is old enough to choose his trade, and no one is accepted for admission to this School unless he has a positive intention of beginning his career as a workman at the trade which he will learn at the School. Having once chosen his trade at the School he is required to stick to it. Then at the end of the three-year course the pupil is turned out a fully qualified journeyman.

CURRICULUM AND METHODS.

It is found that with the method employed at Williamson, three years are sufficient for the pupils to master their trades. The courses have been so arranged as to afford well graded and thorough instruction in the practice as well as theory of trade work together with proper collateral academic training. At the same time the value of a larger mental culture is recognised by devoting time regularly to humanising studies.

In the workshop as one mechanical process is mastered by the pupil it is at once succeeded by another. The student's interest is thus kept up as he realises that the sole object of the instruction is his own advancement in the trade. Pupils are taught, under a special bonus scheme, to work speedily but never at the expense of accuracy. The estimating of costs is part of the instruction so the value of materials is properly appreciated.

The theory of trade work is given in the form of workshop talks by the trade instructors in the workshops. (See below.)

The academic training includes mechanical drawing, mathematics, applied mechanics, etc., while under the head of cultural studies the following subjects are included:—English Language, and Literature, American Literature, U.S. History, Geography, Music and pure Science. The students work 43 hours weekly—that is 8 hours dairly for 5 days and 3 hours on Saturday. During the first two years the time is equally divided between workshop and class-room studies. During the last six months the whole day is spent in the shops, thus preparing the pupil for the transition to commercial conditions. Nothing is made by the students for sale or to fill outside orders. The trade school work is entirely instructional. It is quite compatible with this, however, that useful work should be done by the students. The writer saw a two-storey house which was just being completed, all the work in which had been done entirely by students. Naturally there must be an amount of unproductive labour, for instance, much brick work is done which has subsequently to be pulled down and the bricks cleaned up again.

It will be of interest to show how the students' time is mapped out throughout the three years.

The academic instruction is the same for all trades except farming for the first two and a half years of the course.

COURSE FOR BRICKLAYERS, CARPENTERS, ENGINEERS, MACHINISTS AND PATTERNMAKERS.

FIRST YEAR.

April 1st to August 1st.

		Hours weekly.		Hours.
Arithmetic		3	Grammar	2
Geography	General Review	2	American Literature	2
U.S. History		2	Vocal Music	1
Physiology		2	Mechanical Drawing	6

Workshop, 20 hours per week.

September 1st to April 1st.

Arithmetic	3	American Literature	2
Algebra	2	Vocal Music	1
Physics	2	Mechanical Drawing	6
Civil Govt. Gen. Review	2	Workshop	20
Grammar	2		

SECOND YEAR.

April 1st to August 1st.

Arithmetic Mensuration	3	English Literature	2
Algebra	2	Vocal Music	1
Grammar	2	Mechanical Drawing	6
Physics	2	Workshop	20
Chemistry	2		

September 1st to April 1st.

Algebra	3	English Literature	2
Geometry	2	Vocal Music	1
Grammar	2	Mechanical Drawing	6
Physics	2	Workshop	20
Chemistry	2		

THIRD YEAR.

April 1st to August 1st.

Geometry	3	Commercial Course	2
Trigometry	2	Mechanical Drawing	8
Physics	3	Workshop	23
Chemistry	2		

September 1st to April 1st.

All Trades spend eight hours daily and three hours Saturday in the shops during the last six months of the course. During this period they spend a certain amount of time weekly in Evening Classes.

Thus Engineers, Patternmakers and Carpenters take the following classes:—

Strength of Materials, 1½ hours weekly.

Steam, Gas and Electricity, 1½ hours weekly.

The Machinists take in addition the following:—

Geometry, 1½ hours weekly.

Trigonometry, 1½ hours weekly.

The Bricklayers omit Steam, Gas and Electricity, but take the other three classes.

The Farmers' Course is quite differently set out from the other trades.

FIRST YEAR.

Arithmetic	2	Music	1
History	2	Botany	2
Geography	2	Drawing	6
Grammar and Spelling	2	Soils	2
Literature	1	Breeds of Livestock	2
Physiology and Hygiene	2	Farm Practice	36

The hours devoted to Farm Practice in the First and Second Year are 5—7 a.m. and 1—5 p.m.

SECOND YEAR.

April to September.

Mensuration	3	Music	1
Grammar and Spelling	2	Commercial	2
Literature	2	Feeds and Feeding	2
Civil Government	2	Agronomy	2
Chemistry	2	Farm Practice	36

SECOND YEAR.

September to April.

Algebra, Grammar, Literature, Civil Government, Physics, Chemistry, Music, and Commercial as in first half of the year.

Veterinary Science	2
Agronomy	2
Farm Practice	36

THIRD YEAR.

Farm Practice 5½ days weekly for two successive weeks and then each third week seven full days.

Lectures are given from time to time covering in detail some branch of Farm Practice.

A chance is given for original work. Each student is required to assist in farm management for a specified number of days. Time is allowed for experimental work in crop growing, feeding and manufacturing farm produce.

During the latter part of the year attention is given to marketing farm produce and the business management of a farm.

FARM PRACTICE.

This includes:—

(1) Farm Mechanics: Talks rleating to farm machinery; Blacksmithing; Farm Carpentry; Concrete Construction; Steam and Gas Engines and Electric Motors.
(2) Stock Farming.
(3) Dairying.
(4) Poultry Raising.
(5) Horticulture, Fruit Growing and Farm and Market Gardening.
(6) Market Farm Produce—Meat; Organisation in Marketing; the World's Markets; Cold Storage.

The Equipment of a Typical English Technical College

THE MUNICIPAL TECHNICAL COLLEGE, HALIFAX.

I spent a very profitable day at Halifax, where I visited the Municipal Technical College. The Principal, Mr. James Crowther, B.Sc., was good enough to conduct me round the building and gave me every information desired. The following Laboratories, Workshops, and Sheds were visited:—

LABORATORIES.

- Mechanical Engineering.
- Electrical Engineering.
- Physics.
- Chemistry.
- Physiology.
- Dyeing.

WORKSHOPS.

- Mechanical Engineering, with Smiths Shops.
- Plumbing.
- Painters and Decorators.
- Wood Work including Patternmaking.
- Carpentering and Joinery.
- Cabinet making.

SHEDS.

- Worsted spinning.
- Cloth weaving.

I give below some details of the equipment, omitting that of the Spinning and Weaving Sheds, which although the most extensive part of the practical equipment of the Halifax Municipal Technical College, is not at present of great interest in Durban where we have no Textile Industries:—

EQUIPMENT OF ENGINEERING WORKSHOPS.

- Two 8 inch hand lathes. One 6 inch centre lathe.
- Two 8 inch hand lathes, double geared, with compound slide rests.
- Two 6 inch centre, sliding, surfacing, and screw-cutting lathes,
- One 8 inch centre, sliding, surfacing, and screw-cutting turret gap lathe.

THE EQUIPMENT OF A TYPICAL ENGLISH TECHNICAL COLLEGE.

One 6 inch centre, sliding, surfacing, and screw-cutting lathe, with compound slide rest and taper attachment.

One 7½ inch centre, slide, surfacing, and screw-cutting lathe, wpith compound slide rest and taper attachment.

Seven wood-turning lathes. One 12 inch by 30 inch universal grinding machine.

One 14 inch double grinder for tool-grinding machine, and dry grinding.

One horizontal boring machine with special facing attachment.

One No. 1½ "Cincinnati" universal milling machine.

One 6ft. by 24 inch planing machine.

One 3 ft. 6 inch radius radial drilling machine.

One small drilling machine. One 12 inch stroke "Eagle" shaping machine.

One 6 inch stroke slotting machine with canting and rotating table.

One Miller's Falls power hack saw. One grinding stone. Twenty-five vices.

Marking-off table. Surface plates. Micrometer gauges. Depth gauges.

Sets of standard cylindrical gauges, limit gauges taps, and stocks and dies.

One Smith's hearth, with rotary blower, etc. One gas furnace.

EQUIPMENT FOR MECHANICAL ENGINEERING LABORATORY.

Apparatus for

(a) Determination of length, area, volume, thickness, weight, specific gravity, etc., including the use of scales, verniers, slide, calipers, micrometer gauges, wedges, planimeters, cathetometer, sextant, balances, specific gravity bottles, hydrometers, spherometers, and spring balances from 2 to 200 lbs.

(b) Verification of the principles of the triangle, parallelogram, and polygon of forces, and the application of the principles, including the use of model jib crane, roof trusses, and loaded links.

(c) Studying the motion of simple and conical pendulums, simple harmonic motion, acceleration due to gravity, froce and motion, conversion of energy.

(d) Determination of Young's modulus, modulus of rigidity, strength of wire in tension and torsion, strength and stiffness of springs.

(e) Experiments on levers; strength and stiffness of beams.

(f) Studying the laws of friction.

(d) Determination of the efficiency of the following machines:— Wheel and axle and compound axle, pulley blocks, differential pulley and worm and wheel chain blocks, large crab screws, screw and hydraulic jacks, worm and wheel crab, inclined planes, etc.

(h) Studying the motion of crank and connecting-rod, cams, trains of wheels, slip of belting, also large valve, link motion and governor models. Gyrometers.

(i) Verification of the laws of hydrostatics and pneumatics.

(j) Dertermination of the mechanical equivalent of heat, vapour pressures, temperature and pressure of steam, specific heat of solids and liquids, latent heat of ice and steam, conductivity of metals, and expansion of solids, liquids and gases.

(k) Studying the laws of the flow of water through orifices and over weirs, illustrating Bernouilli's theorem and the principle of the Venturi meter, and for studying the impact of a water jet on flat and curved surfaces.

Dynamometers for testing engines and electrical motors; M'Innes Dobbie indicator. Simplex indicator. Apparatus for caliberating indicators.

Two coal calorimeters. Siemen's water pyrometer. Orsatt gas apparatus.

Junker's gas and oil calorimeters. M'Innes steam calorimeter.

Stop clocks and watches, tachometers, revolution counters, weighing machine.

Fifty-ton testing machine. Goodman's extensometer. Cement tester.

Pulsometer centrifugal pump driven by 5 h.p. electric motor. Pulsometer steam pump.

15 inch Pelton wheel with adjustable nozzle.

18 B.H. Campbell's suction gas producer.

20 B.H.P. gas engine (Crossley) with two self-starters.

10 B.H.P. gas engine (Campbell). 6 B.H.P. oil engine (Campbell).

20 B.H.P. compound steam engine (Robey) fitted with condensing plant, measuring tanks, etc.

High pressure Cornish boiler fitted with pressure reducing valves, injector, steam trap and measuring tanks.

THE EQUIPMENT OF A TYPICAL ENGLISH TECHNICAL COLLEGE.

EQUIPMENT OF ELECTRICAL ENGINEERING LABORATORY.

One 20 kilowatt motor alternator. The alternator is of the rotating magnet wheel type, and arranged to give single or polyphase currents.

One 5 B.H.P. single phase motor. One 5 B.H.P. 3-phase motor.

One variable speed 5 B.H.P. shunt wound motor.

Rotary converter, alternator, and series and shunt dynamos, and motors of various sizes.

Compound wound motor generator set.

Secondary cell arranged for cyclic efficiency tests.

Two series motors of 4 B.H.P. each arranged to run in series or parallel off the 460 volt mains.

Several single, two and three-phase motors arranged for testing.

Electric fan with apparatus for measuring air delivery.

Transformers to work at 2,000 volts pressure. Potentio meter up to 600 volts.

An Ondograph of Hospitaliers' type for tracing wave forms under different conditions of load, etc., and for harmonic analysis experiments.

Ayrton and Perry secohmmeter for measuring coefficients of self-induction. Standard self-induction.

A Flicker photometer for testing candle powers. Standard lamp.

Two synchronous motors of about 5 kilowatts each, one of which can be used as a rotary convertor.

A Kelvin balance, Ballistic galvanometer, Dolezalek electrometer, Hibbert magnetic standard, etc., etc.

Ammeters, voltmeters, and wattmeters, of various types.

Electric Watthour and Coulomb meters, both electrolytic and motor meters, continuous and alternating.

Arc lamps of various types. Metal filament lamps.

A Tudor battery, completely arranged for lighting.

Metre bridges and Post Office boxes. Insulation testing set and Silvertown testing set.

Galvanometers of the Thomson and D'Arsonval types.

Ballistic galvanometer, standard low resistances for resistance and E. M. F. testing etc., standard high resistances for the same.

Printed by
P. Davis & Sons, Ltd.
Durban.